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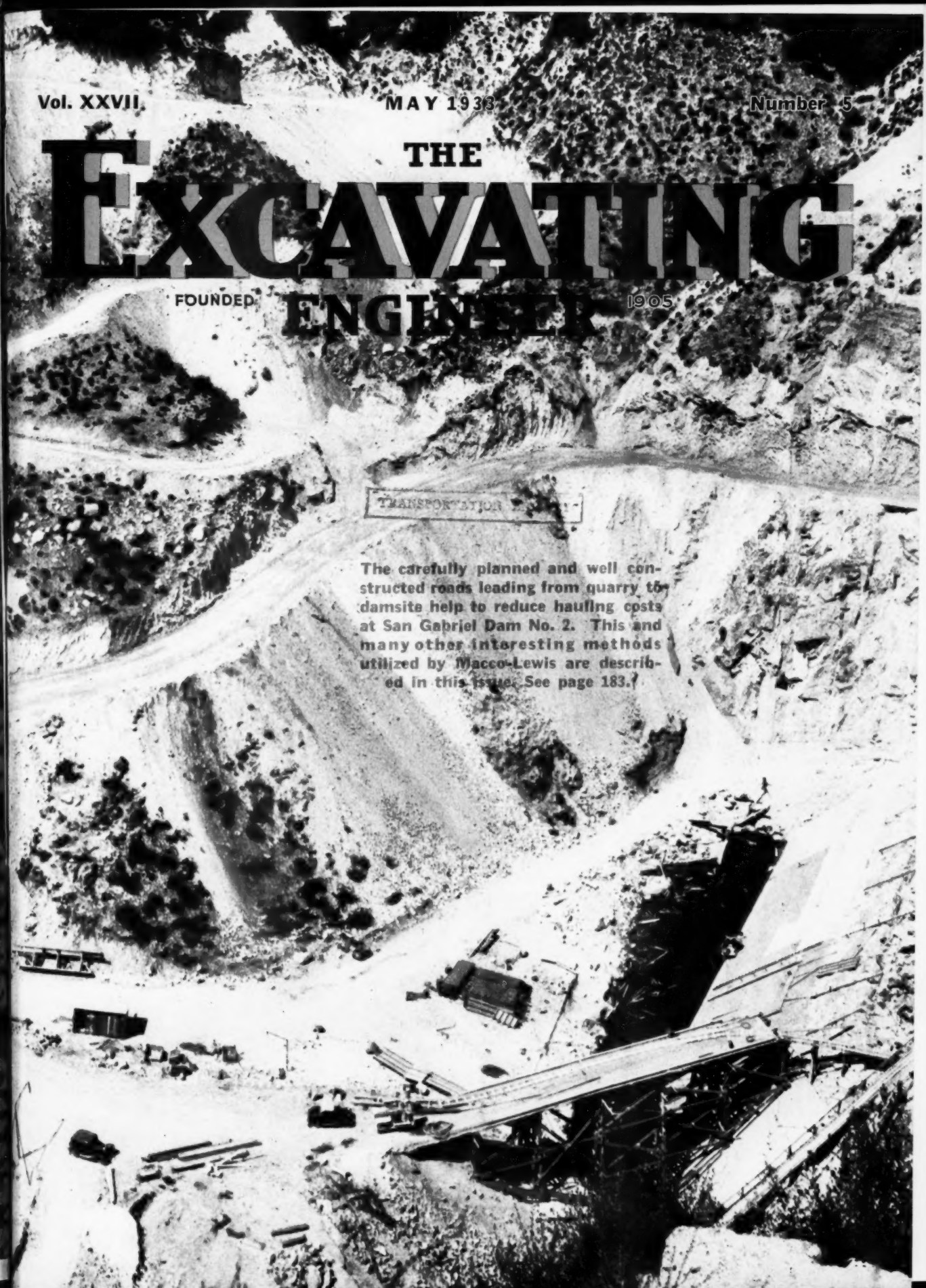
THE EXCAVATING ENGINEER

FOUNDED 1905



TRANSPORTATION

The carefully planned and well constructed roads leading from quarry to damsite help to reduce hauling costs at San Gabriel Dam No. 2. This and many other interesting methods utilized by Macco-Lewis are described in this issue. See page 183.

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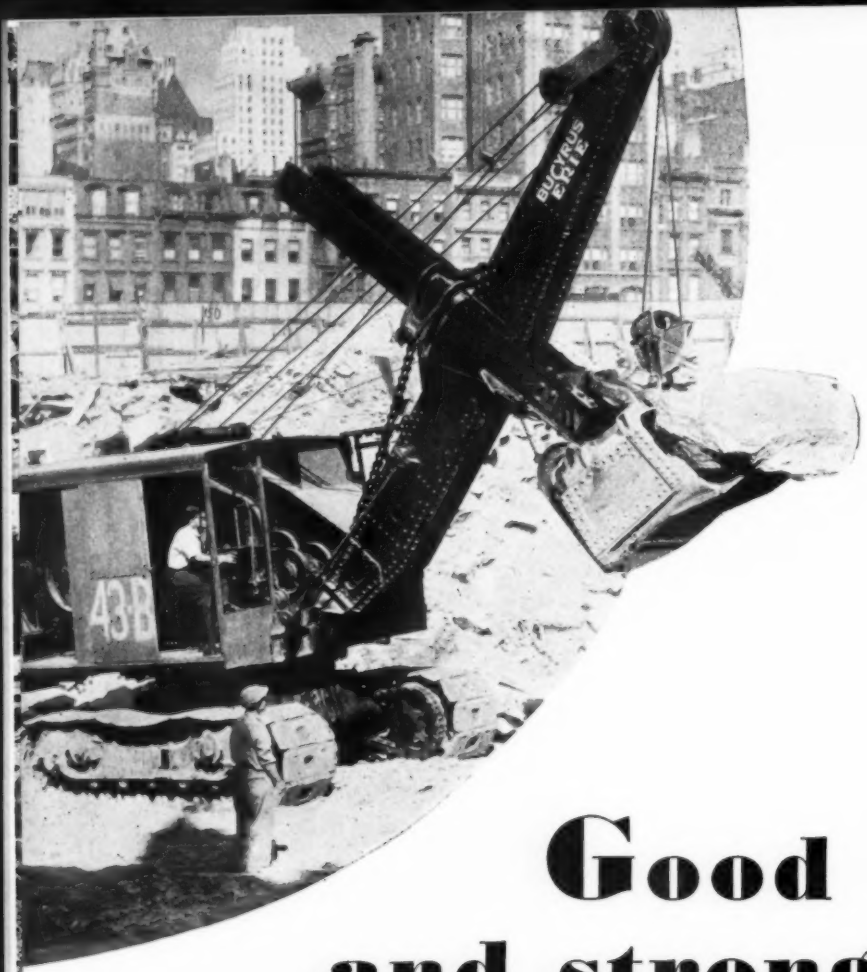

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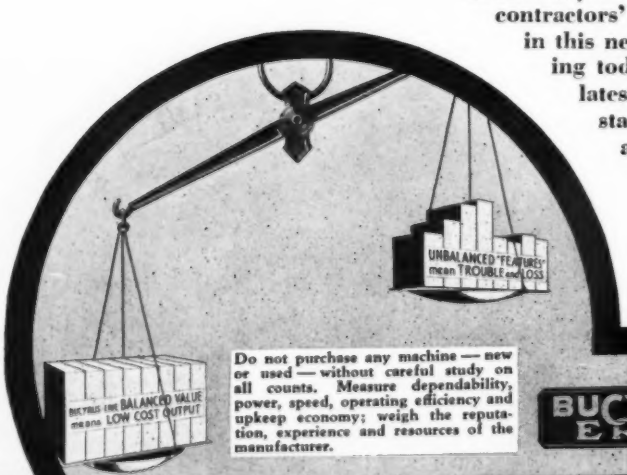

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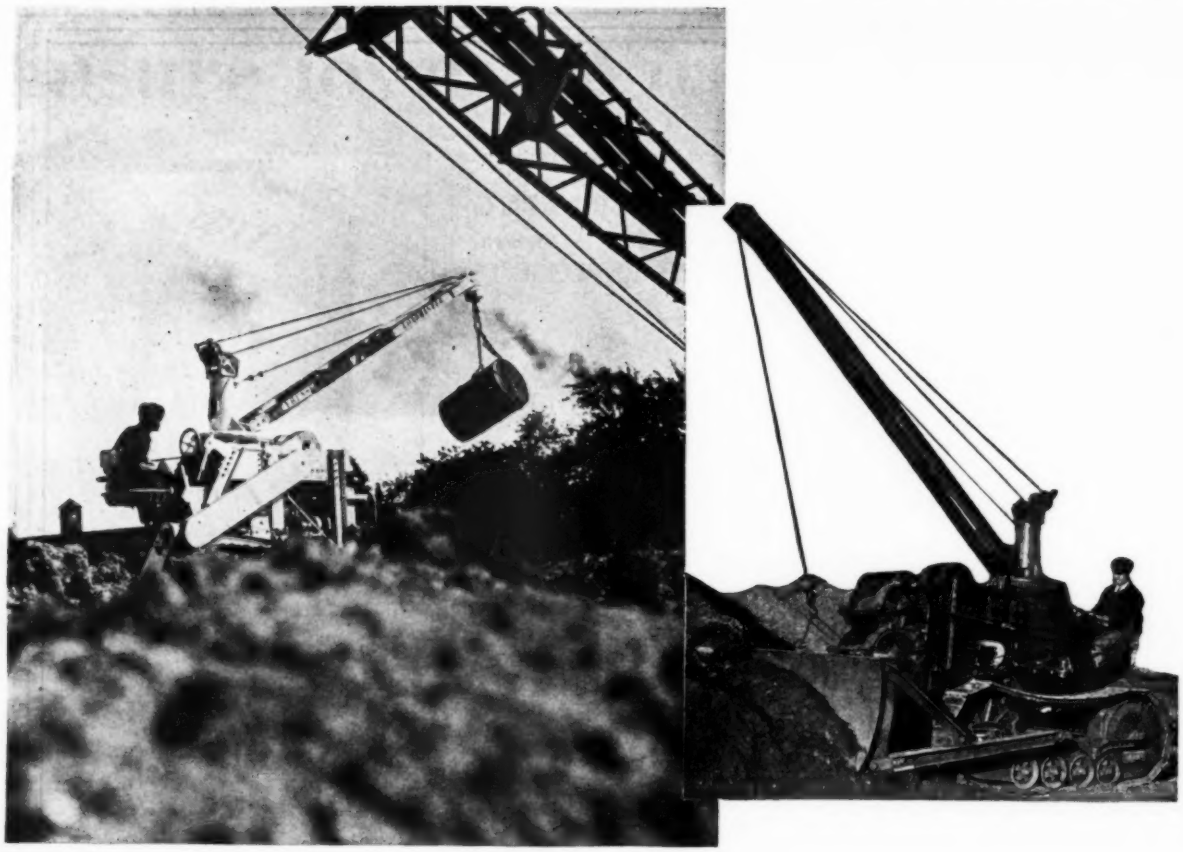

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- dipper teeth to move from shop to shovel and shovel to shop
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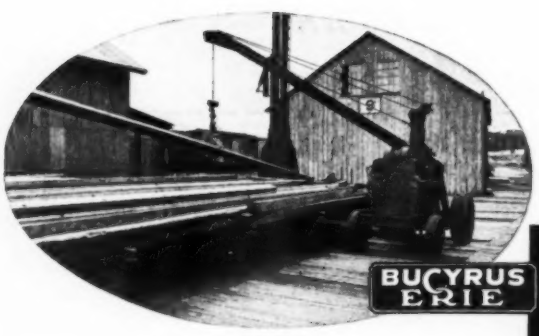
- or any other job of lifting, carrying or placing to do, call on the Loadmaster to save you time and money.

Send the post card bound in the center of this issue for complete details. Bucyrus-Erie Company, South Milwaukee, Wis.



LOADMASTER

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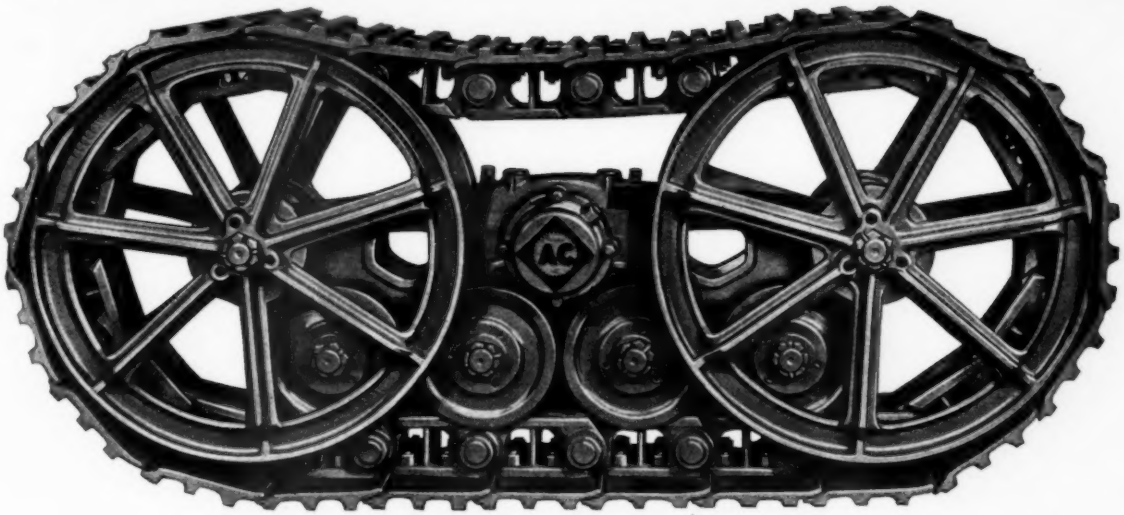

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For your convenience in writing to Allis-Chalmers Mfg. Co., you will find a card bound in this issue.

Team work . . . *Bucyrus-Erie 120-B ¼-yard electric and 52-B 2¼-yard Diesel piling heaping loads into the giant Sterlings at San Gabriel No. 2 quarry.*

EXCAVATING ENGINEER
FOUNDED 1905

MAY, 1933
VOL. XXVII NO. 5

SAN GABRIEL No. 2 —a Rock Fill Dam of Unusual Interest

Over one million one hundred thousand cubic yards of rock will be quarried and placed several months before the time limit by Macco-Lewis, Incorporated.

By WALLACE A. SAWDON

AS IS so frequently the case with dam sites, the location of San Gabriel Dam No. 2* of the Los Angeles County Flood Control District presented many difficulties to be overcome before even the first yard of excavation could be taken out or the first piece of rock for the dam's construction quarried. This project is located on the west fork of the San Gabriel River about twenty miles by road north of the town of Azusa, California and twenty-five miles north and east of Los Angeles. The dam is of the rock fill type and is being constructed by Macco-Lewis, Incorporated, engineers and contractors of Clearwater, California. The design was made by E. C. Eaton, Chief Engineer of the Los Angeles County Flood Control District, with A. J. Wiley and L. C. Hill, consulting engineers and Dr. Robert Hill and Prof. C. F. Tolman, geologists. The construction work, now about fifty per cent completed with the most difficult portions already finished, is in charge of Charles Clapp, general superintendent for Macco-Lewis, Incorporated.

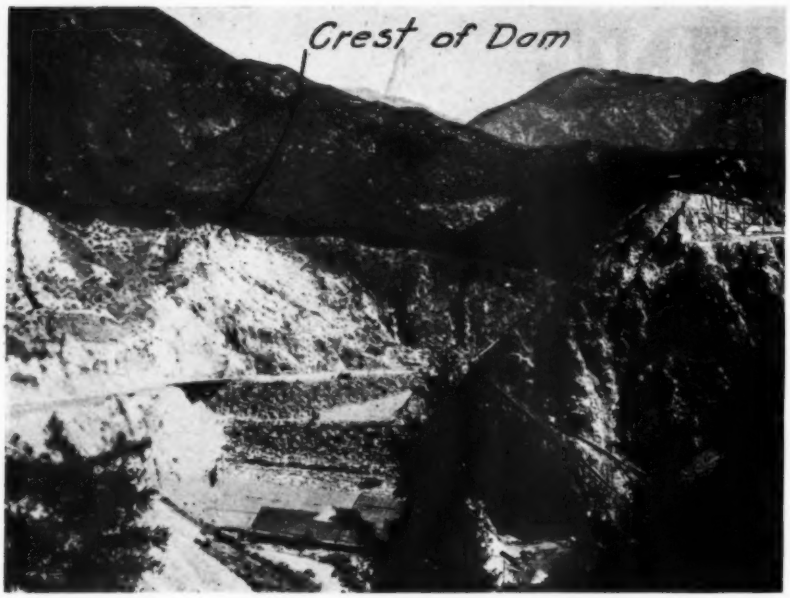
*NOTE: San Gabriel Dam No. 2 is not to be confused with the larger San Gabriel Dam No. 1, which is being built by the West Slope Construction Company. Work on No. 1 is just getting underway and we hope to present an article on this project as soon as sufficient progress has been made to establish reaults of the operating methods used.

John Macleod, President, Macco-Lewis, Incorporated.

The San Gabriel River leaves the foothills just north of the city of Azusa after tumbling down a narrow canyon from the mountains where it gathers its water. A road wound up this San Gabriel Canyon to the junction of the east and west forks of the river; but no road extended beyond that point along the west fork on which the dam is located, until work on the dam was started.

A road from the forks to the dam site thus had to be built before even a camp could be erected. This road now is approximately eight miles in length and winds through the canyon with about thirty river crossings. It had to be built with side hill cuts and over large boulder washes; but being of temporary construction and the stream in most places having a solid bed, few bridges were necessary and fords alone sufficed for the majority of the crossings. With another two

Loading into trucks from the ¾-yard dipper of the 120-B.



A general view of San Gabriel Dam No. 2 taken from the upstream side during construction.

miles added beyond the dam to reach the quarry, together with other side roads necessary in the conduct of the operations, the job required the construction and maintenance of probably twelve miles of roads.

The stream bed elevation of the dam is 2150 feet and above this the dam will rise a vertical distance of 255 feet. Its width at the crest will be 750 feet with a thickness there of 18 feet. At the bottom the width will average 300 feet while its thickness at the stream bed from the upstream to down stream face will be 800 feet.

Twenty-five to thirty ton rocks utilized

The vast quantity of rock necessary for the construction of a rock fill dam of this size can easily be imagined. The total estimated quantity is 1,117,500 cubic yards which is being quarried and placed in three classes:

Class "A"—Dump rock used for the loose dump fill. . . . quarry chips and rocks to 14,000 pounds. . . . 970,000 yards.

Class "B"—Fifty per cent 6000 to 14,000 pounds. . . . fifty per cent 15,000 pounds or greater. . . . 95,000 yards.

Class "C"—Packed rock on face of dam. . . . quarry chips and rocks of 14,000 pounds. . . . 52,500 yards.

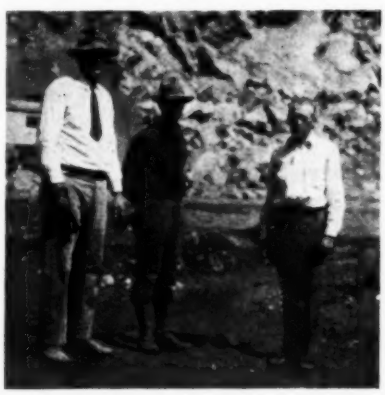
The rock is dense and weighs 175 pounds per cubic foot. A great deal of the Class "B" rock has been placed in pieces of from 25 to 30-tons with the latter about the maximum size that can be handled by the trucks.

The diversion tunnel through which the river now flows is 1032 feet in length and is lined with 12 inches of reinforced concrete, the diameter at the face of the lining being 14 feet. It is located in the south abutment and since it will be used as a permanent water outlet will be equipped with six 84-inch butterfly valves. Four riser tunnels take off from the main tunnel and these are lined with Gunnite.

About 100,000 cubic yards of abutment excavation was necessary before starting the rock fill work and 60,000 cubic yards were sluced off hydraulically. A 4-stage, 1400 G.P.M. Byron Jackson centrifugal pump direct connected to 2-250 h.p. General Electric motors were used for this work at nozzle pressures varying from 40 to 250 pounds.*

180,000 yards of excavation in spillway

On the south side is also located the spillway. This is cut in the rock abutment hill and starts at



Messrs. Sawyer, McCutcheon and Clapp.

*NOTE: In an article which appeared in the September 15, 1932 issue of Engineering News Record, E. C. Eaton, Chief Engineer, Los Angeles County Flood Control District, gives the following description of the sluicing operations:

"The specifications . . . did not permit the use of explosives . . . Preparation of the site required removal of overburden within a pay area of 3.37 acres on the right abutment and 2.88 acres on the left. . . .

"About 450 feet upstream from the heel of the dam a three-stage centrifugal pump was set up in the streambed and directly connected at each end to a 250-hp. motor. The rated capacity of this unit was 2,100 gallons per minute against a 300 foot head; the suction lift was 8 feet. From the pump a 12 inch welded discharge line was extended down stream to the heel of the dam and divided into two lines carried on wooden trestles near the line of the upstream face. Valves were installed at the pump and nozzles, and a telephone line was provided to facilitate regulation.

"The 6-inch monitor was of standard ball-and-socket joint type and was provided with nozzle sizes of 2½, 3 and 4 inch. The monitor was counterweighed with rock and controlled by one man. Pressure gages were installed at the nozzles. Four set-ups were made, there being only one monitor in use at a time.

"In general, sluicing operations started with a 2½-inch nozzle, with pressures of 175 to 185 lbs. per square inch to provide cutting and loosening power. Later 4 and 6-inch nozzles were inserted, with pressures of 30 to 5 pounds per square inch for washing down. The earth and loose rock yielded readily to the jet, and the greater part of the material removed at each set-up came off during the first few hours of sluicing.

"The left abutment . . . slope from streambed to crest averages 0.85 to 1. During the first 24 hours sluicing was at a rate of nearly 200 cubic yards per hour. Another 22 hours was required to sluice down to streambed the loosened material and cut out the larger pieces.

"The general shape of the right abutment . . . is convex, projecting into the streambed with an average slope . . . of 1.06 to 1. Sluicing was consequently much slower . . . because of the flatter slope. On this abutment the material tended to hang up on the benches, requiring some hand work . . . Water tended to wash out the fine material, requiring barring and loosening of the heavier masses.

"Results accomplished to May 31, when practically all the rough sluicing had been completed, included removal of 23,000 cubic yards of material from the right abutment, with 152.6 acre foot of water, giving a volumetric ratio of water used to material washed down of 1.07 to 1. On the left abutment 5,000 cubic yards was removed, with 21.5 acre-ft. of water giving a volumetric ratio of 6.9 to 1.

"A total of 198 hours with the cutting nozzles was required to loosen the 28,000 cubic yards of overburden. The remaining 186 hours of sluicing was required to wash down the loosened material with the larger nozzles.

"The maximum rate of removal was 300 cubic yards per hour; the average loosening rate with cutting nozzles was 140 cubic yards per hour, and the average sluicing for both operations was 73 cubic yards per hour.

"At each set-up the jet was used tangentially to the mass to be removed. The maximum distance measured radially from the monitor to the farthest point reached by the jet was 250 feet. This was, of course, with the smallest nozzle and the maximum pressure. Nozzle pressure used depended principally upon the radius of operations desired, and the size of the nozzle depended upon the cutting power needed for dislodging masses."

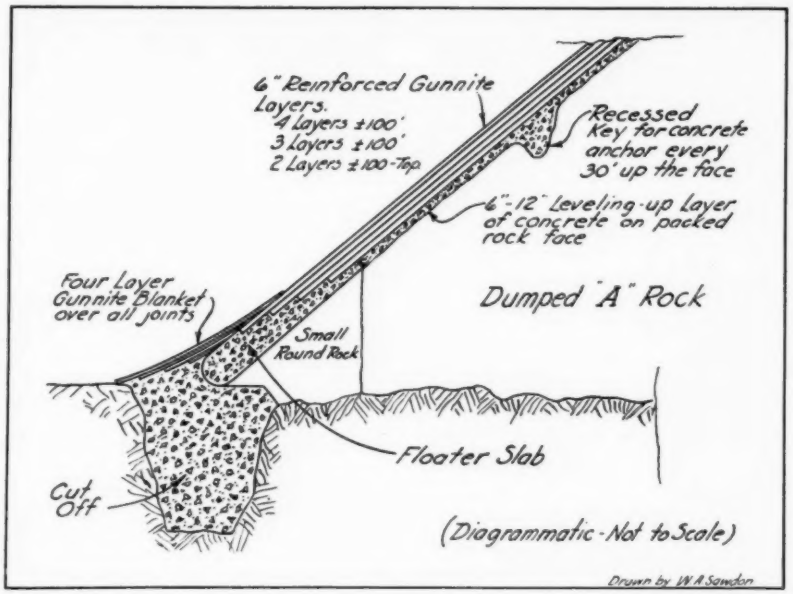
a level twenty feet below the crest of the dam. In the construction of this alone there were 180,000 cubic yards of excavation and 3,000 cubic yards of concrete. With a length of 660 feet, it is 140 feet wide at the top, 40 feet wide at the bottom and has 12-inch reinforced concrete walls 10 feet high.

"Hinges" and flexible laminated layers give flexible construction

The toe and apron construction is indicated in the drawing on this page and it will be noted that the cut-off slab is hinged to the upstream face to increase flexibility and prevent cracking. In the design of the dam, due consideration was taken of probable earth movements; and the character of the formations together with the likelihood of subsurface disturbance led to the selection of the rockfill type of this particular construction.

Diversion Tunnel During Construction.

With the dump rock "A" in place, the pack rock pieces are carefully selected and set with a Bycyrus-Erie Diesel+Air crane. On the face thus established is placed a leveling-up layer of concrete which varies from six to twelve inches in thickness. The facing slabs then placed on this with steel reinforcement are Gunnited. All these slabs are 6 inches thick and 30 feet square with the upper ones making a staggered lap of from three to ten feet with the layer beneath. There are four of these laminated layers for about one hundred feet from the bottom of the face; three for the next hundred feet; and two from there to the top of the dam. Between each layer is one-eighth inch of asphaltic preparation which, providing for any necessary sliding of the laminated layers over each other, combines with the hinged cut-off slab to insure a free movement of the parts without destruction in the case of any disturbance.


6" Reinforced Gunnite Layers.
4 Layers ±100'
3 Layers ±100'
2 Layers ±100'-Top
Recessed key for concrete anchor every 30' up the face
6"-12" Leveling-up Layer of concrete on packed rock face
Four Layer Gunnite Blanket over all joints
Small Round Rock
Dumped "A" Rock
Floater Slab
Cut Off
(Diagrammatic-Not to Scale)
Drawn by W.A.Sandon

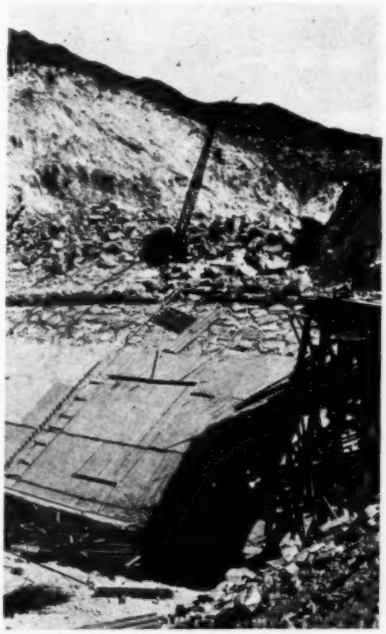
The up stream face of the dam is designed to meet any conditions that may arise.

The poured concrete was mixed on the top of the hill forming the south abutment of the dam and carried to the forms by chutes. These chutes can be seen in the larger illustration on the opposite page. The facing concrete work was sub-contracted by the Case Construction Company.

The Owl Trucking and Material Company operates the screening plant and delivers the materials to Macco-Lewis in the latter's bunkers at the spillway for a unit price.

Quarry equipment selected with great care

The source of rock supply is, of course, an all important factor in the construction of a rock fill dam;—that, and good equipment for handling the rock. Macco-Lewis, Incorporated, selected a 4-cubic-yard Bucyrus-Erie 120-B electric and a 2¼ cubic yard Bucyrus-Erie 52-B Diesel for their quarry work. While the quarry is located but two miles upstream from the dam site, the canyon was so narrow at this point that when the job was started the 120-B shovel could not make a complete swing until part of the rock had been taken out. The walls here sloped up steeply to heights of from 300 to 500 feet above the streambed and the work was started at the toe of the slope where the road ended. Loading was, therefore, at first done with a Bucyrus-Erie 52-B Diesel driven shovel, with the 120-B cutting in as soon as she had room enough to operate.



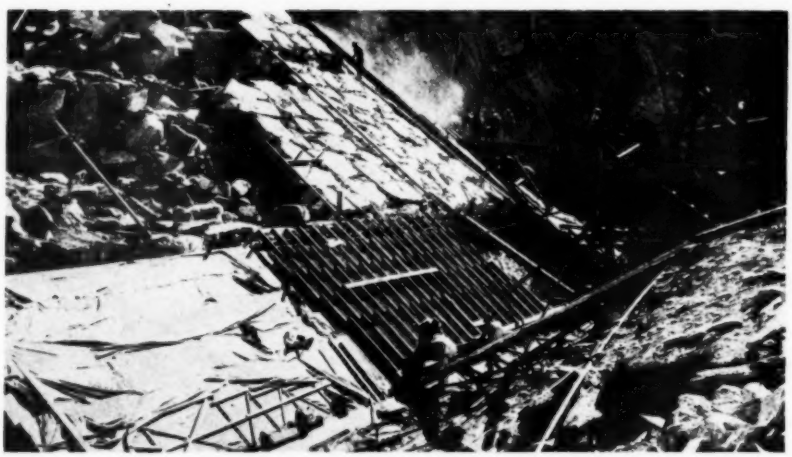
Placing pack rock with Bucyrus-Erie Diesel+Air. Facings partially completed.

Armstrongs drive holes to 285 feet deep

The general procedure followed in blasting the first rock was to drill holes up to a length 40 feet with 1¼-inch Ingersoll-Rand pneumatic Leyner drills. These holes were sprung on an average of four times each with 80 per cent gelatine. When completed, they were loaded with 20 per cent free-flowing quarry special powder which was blown in with compressed air. While this method will continue to be used during the remainder of the job, the major lifting of rock is now being done by means of wells drilled down from above.

About twelve of these wells are usually handled in a shot and will lift out an estimated 120,000 cubic yards of rock. They are located on a ledge cut out above the present quarry operations and are drilled with Armstrong drilling rigs of which three are being used for the job. In the group of twelve being prepared at the time of our visit, four of the wells average a depth of 285 feet while the other eight average 250 feet. The holes are sprung for six feet at the bottom and their total depth reaches from three to four feet below the level of the quarry floor. The four deepest wells are wet and will be shot with gelatine; the others are dry and will be shot with black powder. One ton of explosives will be put in the pocket and another ton in the bore hole of the well.

Pack rock in place.



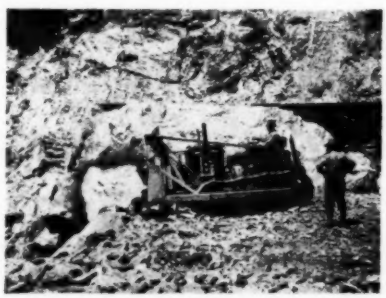
The start of the packed rock face is here shown with some of the first concrete poured still covered. The off-sets in the forms show how the laminated slabs above will rest on the floater slab.

The block drilling in the quarry is done with three Ingersoll-Rand and one Gardner-Denver pneumatic drills. Air for these is supplied by one 1100 Ingersoll-Rand Type 10 compressor. The Armstrong drilling rigs used for the deep vertical bores are electrically operated.

In order to expedite the work and handle more easily the large rock that is necessary for the job, the electric Bucyrus-Erie 120-B, 4-yard shovel was installed in the quarry as soon as possible. Current for operating this is carried to the quarry at 16,500 volts and stepped down by a transformer to supply the shovel at 2300 volts. The shovel is equipped with Ward Leonard or variable voltage control having a motor generator set with individual generators furnishing DC current for their respective motors. The electric equipment is Westinghouse.

25 to 30 ton rocks easily handled by shovel

As has been mentioned, rock is handled up to 25 to 30 tons in weight, this limit being established by the truck capacity rather than by the shovel limitations. The 120-B with its Ward Leonard control handles these larger rocks with ease and operator and machine seem to consider their loading into trucks as just "all in the day's work." The smaller rock is loaded by the 52-B Bucyrus-Erie two-and-one-half yard shovel which is Diesel engine powered. A 75-B Loraine shovel powered by a Waukesha engine is used for waste handling in the quarry. Three other small power shovels, two Lorains and a Koehring, are used on the dam, at a screening plant, and for road work.



A Caterpillar tractor is used to shove the big rock over the edge of the fill when it does not roll off the truck into the proper place.

120-B doing excellent work, production limited by classifying

Commenting on the production Vice President E. J. Davis of Macco-Lewis, Inc., says: "The output of the quarry so far this month (March) is approximately 3,500 cubic yards per day of pay rock and approximately 3,000 cubic yards per day of waste. The sorting of the fines and securing the proper classification of the

rock greatly slows up the operation of the shovels. This is well shown by the fact that we frequently move from 2,500 to 3,000 yards in a shift with 120-B when loading waste. The 75-B Lorain is used essentially as an auxilliary. Whenever the other two shovels are able to handle all of the trucks, the Lorain stands idle. However, it serves a very useful purpose at the beginning of each shift when all of the trucks are in the quarry at one time and at other times when the trucks become bunched through natural operations."

Five Caterpillar "60" tractors are used for various purposes.

Note the special body on this sturdy 12-yard Sterling. The wide rear wheels give an excellent roller treatment to the highway between quarry and dam.

One of these is kept on the rock fill work and with its bulldozer keeps the large rock moving if it fails to dump properly. Placing of the pack rock, as mentioned above, is done with the Diesel powered Bucyrus-Erie crane.

The contract for hauling the rock was sub-let to the McCutcheon Transportation Company. The fleet of trucks on the hauling job consists of ten 12-yard Sterlings, four 10-yard Macks and three 10-yard Sterlings. The big Sterlings (model EC60) are equipped with Waukesha 6-cylinder engines, a new type special rock body and Wood Hydraulic 25-ton hoists. The haul time is averaging about 25 minutes per round trip of 4 miles with time required for dumping from one to three minutes depending on the amount of maneuvering required. There are also three Linn tractor trucks used for service requiring unusual traction ability.

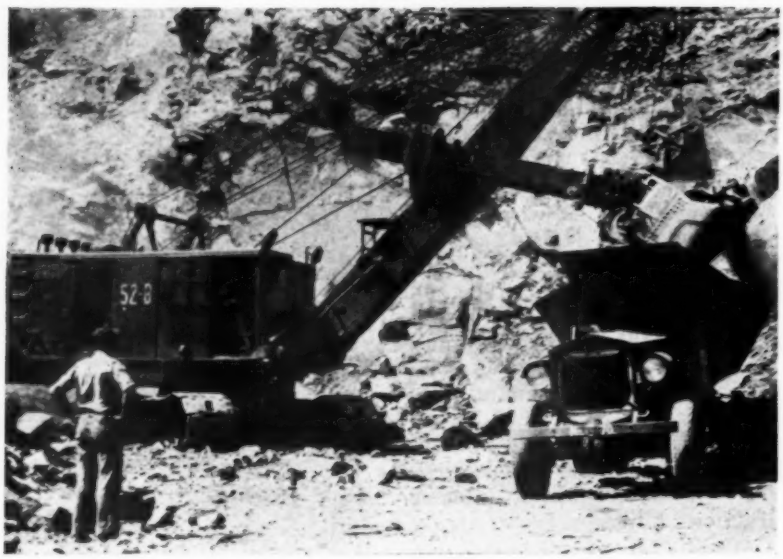
When a big rock is loaded, it is the practice to place about 4-yards of small rock in the truck to act as a cushion for the big one. The height of the 120-B shovel makes it ideal for loading large rocks over the side of the trucks, the big fellows measuring about 10′ from the ground.

A good wide road allowing easy passage for the trucks and with very little grade extends from the quarry to within a few hundred feet of the dam. From this point new roads are constructed as the work progresses to facilitate hauling the rock up to the point of dumpage. This necessitates side hill cutting and the construction of bridges over cross gullies wherever they are encountered.

The face here is about 300 feet high. Compare the height with men, ¼-yard shovel, and trucks on the quarry floor. An Armstrong drilling rig boring a 225-foot vertical shot hole can be seen on a ledge of rock high up in the quarry toward the left.

The main road from quarry to dam is 30′ in width, surfaced with waste from the quarry and with continuous springling with water makes an ideal construction road. The grade averages 3½% with a fair amount of curves which provides efficient truck operation. At the dam site, ramps are provided with a short grade to reach each 25′ lift as the fill progresses. The

Roads for hauling presented quite a construction problem. This group of pictures (approximately panoramic) shows the roads leading downgrade from the quarry which is up the canyon at the left, downgrade to the dam at the right. The several forks give access to the dam at various levels to take care of the hauling as the construction progresses upwards toward the crest. These pictures, as well as the cover picture, were taken on a Sunday, which accounts for the absence of trucks and workmen.



The characteristics of the Diesel make it well adapted to rock digging. This Bucyrus-Erie 52-B Diesel equipped with an Atlas Imperial Diesel engine gives a good account of itself in the Macco-Lewis quarry.

road is bladed when necessary and the amount of water used in sprinkling makes a perfect binder. The big Sterling trucks in the hauling fleet weigh approximately 60,000 pounds gross on four wheels, the rear wheels being equipped with dual 40x14" solid rubber tires giving a 28" tread on each side, which acts as a constant roller and has made extra maintenance unnecessary.

Mats carry trucks over dumped rocks

Owing to the fact that most of the rock is in one cubic foot pieces and larger, it was a serious problem to work out a road on the fill smooth enough to permit operation without unnecessary damage to the equipment or excessive tire wear. The use of crushed rock around 1" in size provides the main road over the fill and at the terminal of this road large rope mats, made of 3" hauser rope similar to collision mats used on battleships are placed at the immediate dumping point. These mats are ten feet long, four feet wide, and weigh approximately 200 pounds. They are easily shifted by the man on the dump directing trucks.

For use on the dam, on the spillway, for Gunniting and other purposes there are two 750 Gardner-Denver compressors always available. Besides these there are also two portable 310 Gardner-Denver compressors; but these are confined almost entirely to road work.

Charlie Clapp, General Superintendent for Macco-Lewis, Incorporated, in charge of the construction work.

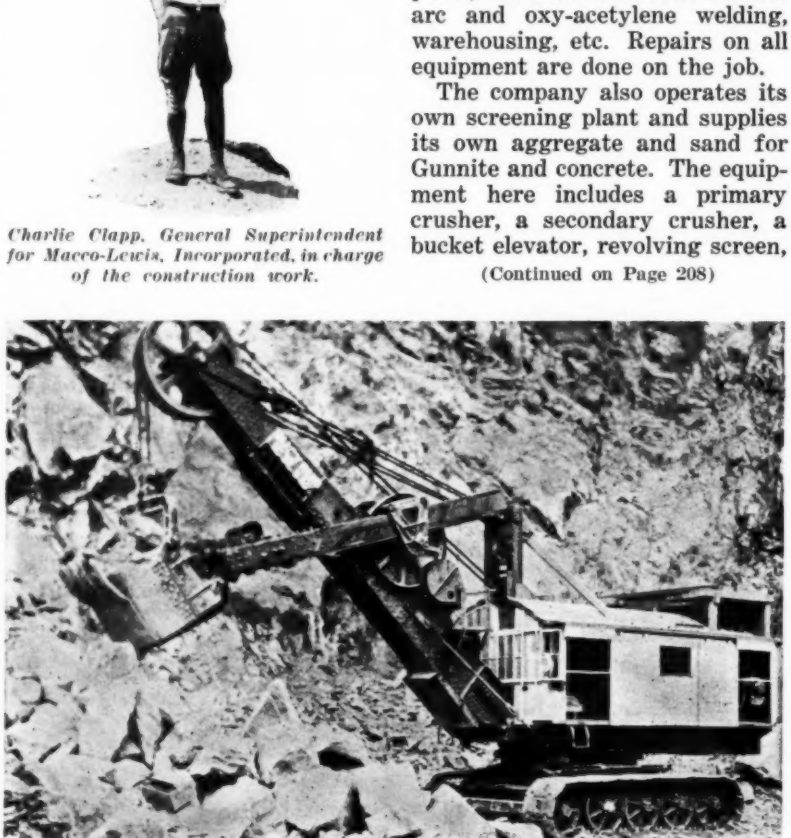
Special power line built in

No power was, of course, available at the dam site and the contractor had to build power lines from the nearest connection which was eight miles away. The current is brought to the dam at 16,500 volts where it is stepped down for work on the dam itself. A 2300-volt line runs from there to the gravel plant but the 16,500 volt line continues to the quarry where it is stepped down to 2300, 440 and 110 volts for various purposes. Electric bulbs are strung across the canyon at the dam site and supply adequate light for night work. The total connected load for the entire project is 1000 h.p.

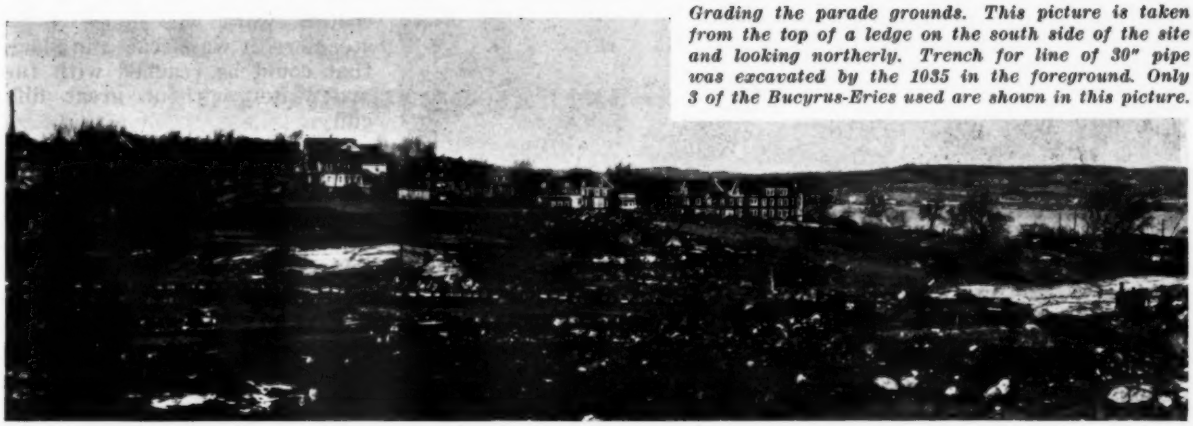
Besides its well appointed camp, Macco-Lewis, Incorporated maintains a complete machine shop with lathe equipment, drill press, facilities for both electric arc and oxy-acetylene welding, warehousing, etc. Repairs on all equipment are done on the job.

The company also operates its own screening plant and supplies its own aggregate and sand for Gunnite and concrete. The equipment here includes a primary crusher, a secondary crusher, a bucket elevator, revolving screen,

(Continued on Page 208)



Bucyrus-Erie 120-B electric in the quarry. A timber platform over the electrical machinery and across the back protects the rear end from falling rock.



Grading the parade grounds. This picture is taken from the top of a ledge on the south side of the site and looking northerly. Trench for line of 30" pipe was excavated by the 1035 in the foreground. Only 3 of the Bucyrus-Eries used are shown in this picture.

New Coast Guard Academy Called for Some Tough Digging

Contractor N. Benvenuti and Sons used five shovels to speed grading of U. S. School grounds in New London, Connecticut

WHEN N. Benvenuti and Sons were given the excavating sub-contract for the recently completed U. S. Government Coast Guard Academy buildings at New London, Connecticut, they tackled quite a sizable grading job. There was 80,000 yards of rock and earth to be moved to grade the grounds, roads, walks, stadium field, tennis courts and to excavate for drainage and for the foundations and basements of the eighteen buildings. The general contract for excavating and building amounted to about two million dollars and was held by Murch Brothers of St. Louis.

Of the 80,000 yards of excavation called for by the N. Benvenuti and Sons sub-contract about 30,000 yards was solid ledge rock and boulders. All of this material plus an additional 8,000 yards of borrow was required for fills to bring the 45 acres in the grounds up to finished grades.

The location of the property is in the northeasterly section of New London opposite the Connecticut College for Women. The academy sets along a hillside overlooking the Thames River, one of the best and highest sites in the city.

Weather a handicap but grading finished in 2½ months

Excavation was started by N. Benvenuti and Sons on January 27th and in spite of unfavorable weather was completed by the middle of April. Considering the type of work that means stepping right along. To accomplish this the Benvenuti organization moved in their four Bucyrus-Erie shovels, B-2, B-3 and Type A steamers plus a 1035 gas machine, in addition using a hired P & H ¾-yard shovel for two weeks for stripping rock. Work was on one shift only.

Here's a sample of the blasted ledge. This broken granite makes a nasty job of digging.

The rock ledges were of a tough granite formation that broke up into large pieces of one to four yards after blasting. The blasted stones were loaded into trucks and in spite of the severe character of the digging the machines handled the work readily

Three of the completed buildings facing the streets. On the left is the Cadet Barracks, middle, the Administration Building and right, the Academic Building. Directly behind the Academic Building is the Enlisted Men's Barracks and in the rear of the Administration Building is the Engineering Building. The Gymnasium, Storehouse and Heating Plant are located well down the slope close to the river in the rear of the Enlisted Men's and Engineering Buildings. Photograph is furnished by Commander G. T. Finlay, executive officer of the Academy.

Drilling and blasting of the tough granite ledges was pushed at top speed regardless of weather. This permitted the builder to get started without waiting for finishing of all the excavation.

with no delays of any importance except for weather. This was very unfavorable during February, March and part of April making ground conditions very disagreeable. Some days it was entirely out of the question to obtain any traction for the trucks although side casting work went on in full force by the all-caterpillar type mounted shovels which were able to travel most anywhere without lost time. Although the site is located on a hillside which offered a fair drainage after a rain, what interfered mostly was the occasional snow storms and the frosts and thaws during the day. After a snow storm for from 3 to 10 days at a time trucking would be out of the question. There was no haul over 500 feet and most of the excavated material was placed within a 200-foot radius. Several thousand yards was just cast over as permitted along the roads on the side hills. Cuts ran from one foot to over twenty feet deep and the fills were in about the same proportions.

During the disagreeable periods mentioned above when trucks could not be used in the hauling, the compressors and drills hammered away every single day at the ledges and consequently one of the most important difficulties was overcome. These ledges were drilled and blasted long before the shovels had actually gotten to them. This enabled the builder to start his part of the work sooner because of the fact that the rock adjacent was already drilled and blasted and its removal was no more dangerous than earth. Some of the ledges drilled and blasted during that time were not actually removed until long after some of the buildings were in place. The shovels excavated the rock without any difficulty whatever.

"Fill'er up" is the order and the dipper is piled up with a heap even in the rock.

Gas shovel handles rock as well as the steamer and saves coal and water haul

Although the contractor kept no efficiency records on the operations of the gas and steam shovels separately, they found from personal observations that the gas shovel was doing just about as well as the steamers in the rock and so no favoritism was shown. When a cut was completed, that shovel was immediately placed in another, worked until the excavation was completed whether it was an earth or a rock cut. However, considerable saving was made in not having to be drawing coal and water to the gas shovel. During disagreeable ground conditions they were able to always work the gas shovel because the 1035 could be sent to remote parts on the grounds for side casting work requiring no trucks, where no coal or water could have been hauled if a steam shovel were used. Although considerable other side casting work was done by the steamers, it was located in places that could be reached with fuel and water without great difficulty.

The side casting work mentioned above occurred in various parts on the grounds was left to be done when the weather and ground conditions were such that trucks could not be used. This condition occurred for days at a time during February and March. Taking this expected condition under consideration, the work was planned so that the shovels could do the side cuts during these unfavorable conditions. This kept the shovels going steadily in spite of the weather and considerable work was accomplished during the bad weather that had to be done anyway.

Trucks were hired locally as needed and included four 5-ton and two 3½-ton Macks, one 5-ton International, one White of the same size, a 2½-ton Relay and a 2½-ton Maccar. The number of these in use each day depended on the weather and excavating conditions.

Here is the 1035 cutting through the road south of the engineering building. This sturdy straight gas shovel proved its ability to keep step with the steamers through both rock and dirt with no favoritism needed or shown.

Excellent results for drilling and blasting

Four Ingersoll-Rand compressors were used, one a 3-jackhammer size, one a 2-jack and two of 1-jack size. These supplied air to five one-inch Ingersoll-Rand S-49 jack hamers, one Cleveland and one Sullivan which were used to drill the 25,000 yards of ledge.

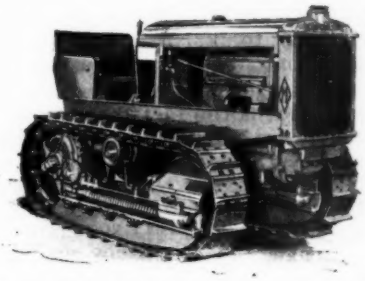
Sixty per cent gelatin Du Pont dynamite was used for the blasting and the electric blasting caps were fired by a Du Pont 100-hole size blasting battery. Excellent results were obtained in the shooting.

(Continued on Page 193)

EQUIPMENT
You Ought to Know About

Allis-Chalmers Announces New Light Weight Tractor

THE NEW MODEL "M," recently added to the Allis-Chalmers line of industrial tractors forms an effective combination with other models meeting



the highest A-C standards and selling at an exceptionally low price. The new model, shown here, weighs approximately 6200 lbs., and develops a maximum of approximately 28 drawbar horsepower; has four speeds forward of 2.23 to 5.8 m.p.h. and one reverse speed reaching 2½ m.p.h. Complete information and prices may be obtained by writing *Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee, Wis.*, mentioning this magazine, please.

Whitcomb Eight-Ton Diesel

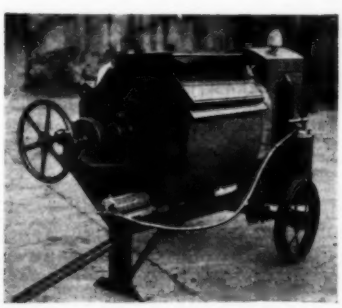
THE WHITCOMB DIESEL locomotive shown here is one of a new series incorporating a solid injection power plant having the same general performance characteristics as the gasoline engine which it replaces. A mechanical transmission drive locomotive, it has a total weight

of 16,000 pounds, evenly distributed over four drivers and will handle a trailing load of 277 tons on a level track. Hourly fuel consumption, according to the manufacturer, is less than two gallons with the Diesel engine operating at a fifty per cent load factor—seldom exceeded in actual service. The engine is equipped with an electric starter and the control system has been simplified to eliminate any possible confusion on the part of the operator. From the viewpoint of maintenance, this Diesel locomotive will not introduce any complications and the operating expenses will be appreciably less than for a similar assembly powered with a gasoline engine. It is the result of several years' experience with the Diesel power plant and represents a design that promises further economies in haulage costs.

The Whitcomb Locomotive Company, Rochelle, Illinois, now offers the trade a complete line of modern Diesel powered locomotives with mechanical transmissions and electric drives. Inquiries from anyone engaged in excavation regarding the Whitcomb line of Diesel and gasoline driven locomotives will be gladly answered by the manufacturer.

Rex Cold Patch Mixer

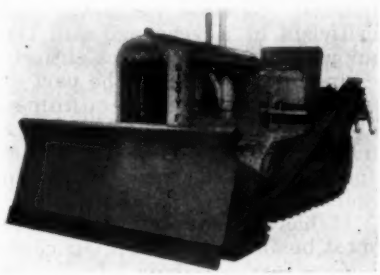
AN IMPROVED model Cold Patch Mixer has recently been introduced by Chain Belt Company. It handles either cut back or emulsified asphalt, and is far ahead of anything in speed



that has been built to date. According to the manufacturer the new unit will mix a batch of emulsified asphalt in 20 seconds, supplying first the mixing action necessary to do a thorough job, and, secondly, doing it in so short a time that the emulsion is perfected—not broken down as frequently happens in longer mixing cycles. On cut back asphalt it will do the mixing in 45 seconds. This new unit is of the Rex pug mill design, equipped with a factory built-in heater integral with the machine but detachable so that it may be removed and used for heating the oil before putting it into the mixer. The Rex Cold Patch Mixer has a capacity of 4 to 6 cubic feet of mixed material, depending upon the type of asphalt and aggregate used, and is equipped with an easy dump hand wheel that makes charging and discharging a far easier job than was ever before accomplished with the back breaking lever. Write *Chain Belt Company, Milwaukee, Wisconsin,* for further information.

LaPlante-Choate "65" Bulldozer

A NEW hydraulically controlled bulldozer has been developed by the LaPlant-Choate Mfg. Co. Inc., to be used on the "Caterpillar" 65 tractor. It is rugged-



ly constructed and has been designed to have both up and down pressure on the blade. It has an extreme 34 inches high lift above ground level and an 18-foot drop below ground level.

With this equipment attached, the tractor drawbar is in the clear at all times, enabling the tractor to be used for hauling wagons, tampers, scrapers, etc., without removing any part of the Bulldozer. Special shock absorbers are provided to absorb any sudden jolts before they are transmitted to the operating mechanism, thus minimizing the chances of breakage and assuring ease of operation. Complete information will gladly be sent by *LaPlant-Choate Mfg. Co., Cedar Rapids, Ia.*

Little Girl (answering doorbell): "My mother told me to tell you she was out, sir."

Installment Collector: "Go and tell your mother I'll be here when she comes back."

EXCAVATING ENGINEER

A Monthly Publication Devoted to Excavating and Allied Subjects

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The Business Situation

A YEAR AGO many well informed business men vigorously opposed the abandonment of the gold standard. Today, the administrative action in regard to our money has been viewed with considerable satisfaction by most thoughtful business men. The marked contrast between the criticism of a year ago and the approval of today, is not entirely change of attitude on the part of business men. In economic changes during the past 12 months will be found the reason for the very decided change in opinion.

It has become self evident to most business men, that our courageous and, perhaps, foolhardy support of the dollar in the international money market, has sent our capital and our gold cascading into other countries, robbing many a manufacturer of possible foreign business and depriving many an industrial, which has only an industrial market, of operating capital he might otherwise obtain.

In the first days of March we witnessed the rare spectacle of everyone attempting to turn their credit into currency upon short notice. A most unusual event that was met very effectively by the administration. In the past few weeks we have seen the administration busy itself quietly and determinedly with putting its own budget in order. Then having established the Government's own credit a very logical step is taken to prevent further dropping of prices and inflation of the dollar's value.

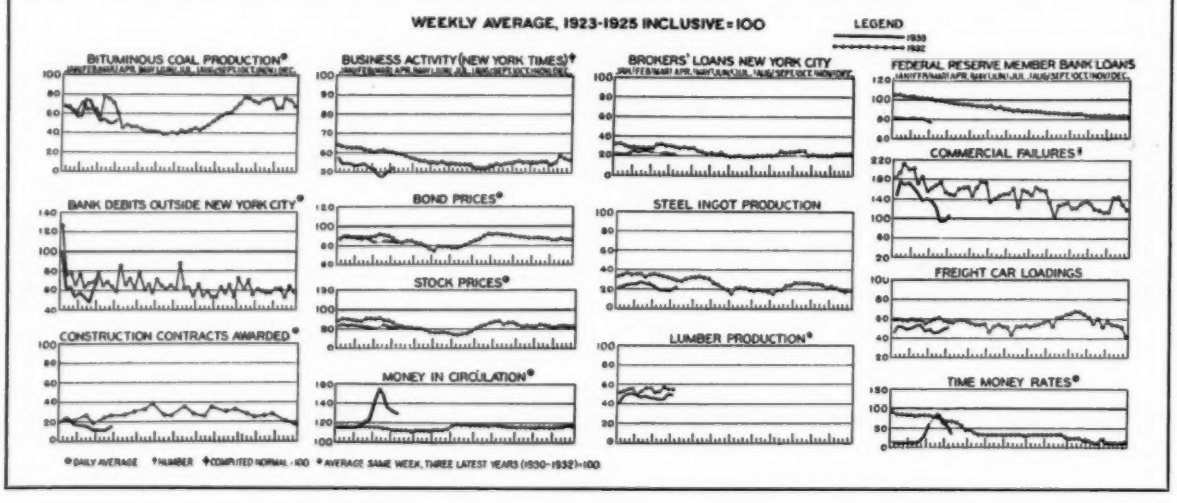
The international value of the dollar and the Domestic value of the dollar are closely associated and it is reasonable to expect that the relative rising of other currencies in terms of the dollar or, the lowering of the value of the dollar in the terms of other currencies, will be followed by a stabilizing of prices in general—by a checking of the dollar's precipitious rise in domestic value. Few informed individuals would care to see another violent and disrupting change in price structure—whether it be upward or downward. Most all agree, however, that controlled inflation is analogous to stabilizing the dollar value. Certainly if this is done there can be no better means of bringing the present business inactivity to a definite end.

Considering the widespread slowing down in business occasioned by the banking holiday the March results in the construction field must be considered encouraging. Normally March shows seasonal expansion in new construction awards; in spite of the banking holiday some seasonal expansion over February occurred. The March contract total of $59,958,500 covering all classes of construction compared with $52,712,300 for February and $112,234,500 for March, 1932, according to F. W. Dodge Corporation.

Of larger present significance, however, is the fact that residential awards during March expanded about 36 per cent as contrasted with February; the March total for this class of work as $16,021,000 as against $11,805,300 for February and $33,208,600 for March of last year. Of the March, 1933 residential total practically 80 per cent represented awards for 1 and 2 family houses; this is of significance in that it is in the small house field where conditions of improvement usually occur first.

For the first quarter of 1933 residential building contracts totaled $39,777,200 as against $85,130,200 for the corresponding quarter of 1932. Of the 1933 quarterly total 75 per cent was for 1 and 2 family houses while the remainder was for apartments and hotels. Of the 1932 quarterly total 78 per cent went into small houses and 22 per cent

WEEKLY BUSINESS INDICATORS



into apartments and hotels.

At the same time the first quarter's contract record for all classes of construction totaled $196,026,800 as contrasted with $286,078,700 for the corresponding quarter of 1932. Non-residential building awards during the quarter totaled $78,761,100 as against $118,757,800 in the same quarter of 1932; public works totaled $62,288,900 as against $57,-161,800 in the first quarter of 1932; while awards for public utilities totaled, $15,199,600 as contrasted with $25,028,900 in the first quarter a year ago.

March construction contracts showed gains over February in all major districts except the Upstate New York, Middle Atlantic, Southeast and Texas territories. All districts showed losses from March, 1932; relatively, however the best showing was made in the Metropolitan New York, Southeast, St. Louis and the New Orleans Territories.

Contemplated new construction of all descriptions reported during March in the 37 states as a whole totaled $144,768,200 as compared with $114,185,900 reported during February and $182,690,400 for March, 1932.

Come On Old Timers!

Cash for Your Yarns and Pictures!

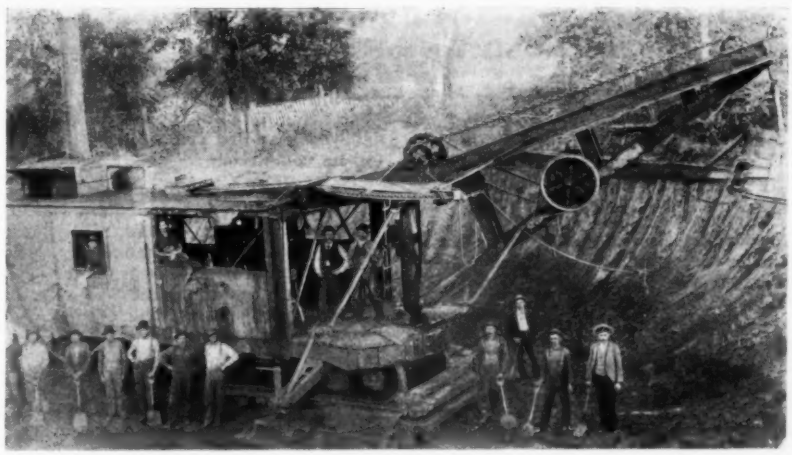
EACH month we will run in this section anecdotes, adventures and interesting data regarding old times and old timers. The makings must come from you. Send along your pictures and letters . . . facts and pictures that made excavating history. Here are a few questions we've been asked. Help us answer them.

1. Back in 1909 and '10 there was a Gopher Excavator built by the Gopher Manufacturing Company, headquarters Palace Building, Minneapolis, and in 1911 and '12 there were some other Gopher machines built by the Dix Machine Company also of Minneapolis. Who has photographs of these old machines? Send them along—the older and earlier the better. There is many another old timer who would be interested in seeing them.

2. One of our Old Timers asks about the early tractor-shovels or tractor-cranes. Can you furnish a description or snapshot on any of these old timers? We understand some of these ancestors of modern equipment were weird contraptions but that some of them worked quite successfully nevertheless.

3. Can anyone furnish pictures or description of "Lockport" shovels? Understand they were approximate duplicates of the Souther "Bostons".

Thank you, Old Timer Sears



IT TOOK quite some gang for a pit crew in the old days when this 45-ton Bucyrus-Erie was considered the last word in economical dirt moving equipment. Describing its operation Old Timer C. A. Sears of St. Albans, West Virginia writes:

"The accompanying picture of this old type 45-ton, built by the Bucyrus-Erie organization, was taken at Sumner, Illinois in 1900. This shovel was leased by the Baltimore & Ohio from the Knickerbocker Ice Company of Chicago and used for grade reduction. The day crew including myself as engineer, C. W. Gose, cranesman, Jerry Harmon night engineer, Burt Lavo, cranesman. There were 27 shovels on this work between Cincinnati and St. Louis during 1899 to 1900. Some of them were owned by contractors, some by the railroad and some of them were leased and operated by the railroad. Most of the machines were double shifted and the rigs included Bucyrus-Eries, Marions, Victors, Vulcans and one old Boston shovel. As one looks over this old outfit and the outfits used today, one cannot help but wonder at the progress that has been made. I hired out on this job as an extra so I had my go at several before I got this one regularly. Sure thought I had a real job with this old friction baby. The Company bought two 65-ton Bucyrus-Eries for this job which they were still using not so long ago."

New Coast Guard Academy

(Concluded from page 190)

At the Benvenuti yard, about 1½ miles from the work, the contractor had available an Ingersoll-Rand pneumatic drill sharpener which sharpened drills for their odd jobs around the city and for commercial purposes. It was found that a considerable saving could be made by doing the sharpening for the Academy job at this shop and haul the drill steel back and forth in one of the contractor's one-yard trucks in spite of the large amount of sharpening required by the extensive drilling.

Trench for tile with shovel

A line of 30-inch tile storm sewer was run through the entire site. This required a trench from 4 to 8 feet deep which was dug by the 1035 shovel to a depth of about 6 inches above grade. As the pipe was embedded in concrete the final 6 inches to grade was removed by hand in order to secure even trimming and accurate grade thereby saving the cost of forms and avoiding any possible waste of concrete. In roughing out the trench the 1035 moved backwards digging the trench behind it and, as Fred Benvenuti puts it, "did a very satisfactory and economical job." He mentioned that they have used the steamers several times on other jobs where similar trenching was required and have found they can dig trench up to 12 to 14 feet deep with very little difficulty.

SHOTS from the Firing Line

13,370,000 Yards in Proposed Project on Rio Grande

By H. S. SMITH, Jr.

DEFINITE action toward eliminating costly floods in the El Paso-Juarez Rio Grande Valley was seen in the recent signing of the boundary treaty between the United States and Mexico. The treaty was based on the report and recommendations of the International Boundary Commission regarding necessary work and cost estimates for the Rio Grande rectification.

The plan, as outlined by the commission, proposes to reduce the flood flow at El Paso and Juarez by the construction of a detention dam and reservoir of 100,000 acre foot capacity at Caballo, and to control this flood flow through the El Paso-Juarez Valley in a shortened channel by the construction of parallel levees. The proposed artificial channel will follow and rectify, in a general way, the present river course from El Paso to Box Canyon below Fort Quitman.

The general engineering features of the project involve the reduction of river length from 155 to 88 miles, the establishment between levees of a floodway, 590 feet wide and a capacity of 11,000 second feet, and the increasing of the gradient from a slope of 1.82 feet per mile to a slope of 3.20 feet per mile. The levees require the placement of 8,985,000 cubic yards of earth. Average height of levees are 7.5 feet. For the excavating of the artificial channel, 4,775,000 cubic yards of earth are required. The areas required for right-of-way for channel are 4,075 acres from the United States and the same from Mexico.

The estimated cost of the project is $6,000,000, and it is believed that five years will be needed for its completion.

The project will eliminate the flood menace throughout the El Paso-Juarez Valley in both the United States and Mexico, will prevent channel changes and detachment of areas from one country to the other, and will permit of reclaiming of low-lying areas.

All earthwork of both channel excavation and levee embankment is planned to be accomplished by machine methods. The unit cost in the estimates is 18 cents per cubic meter. The machines best suited to the work are draglines equipped with 100-foot booms and buckets from two to three cubic yards capacity. However, on a great part of the work, smaller equipment can be used economically.

In building the left levee from the lower end of San Elizario Island (about 25 miles east of El Paso) to the mouth of Quitman Canyon, it is planned to secure material for levee embankment from the channel excavation. At practically all other locations the material will be secured from discontinuous borrow pits located on the channel side of the levees. Practically no material will require a second handling.

The International Boundary Commission, United States Section, is composed of L. M. Lawson, commissioner; C. M. Ainsworth, consulting engineer; and Clark W. Creps, secretary. The Mexican Section is made up of Gustavo P. Serrano, commissioner; Armando Santacruz, Jr., consulting engineer; and Jose Hernandez Ojeda, secretary.

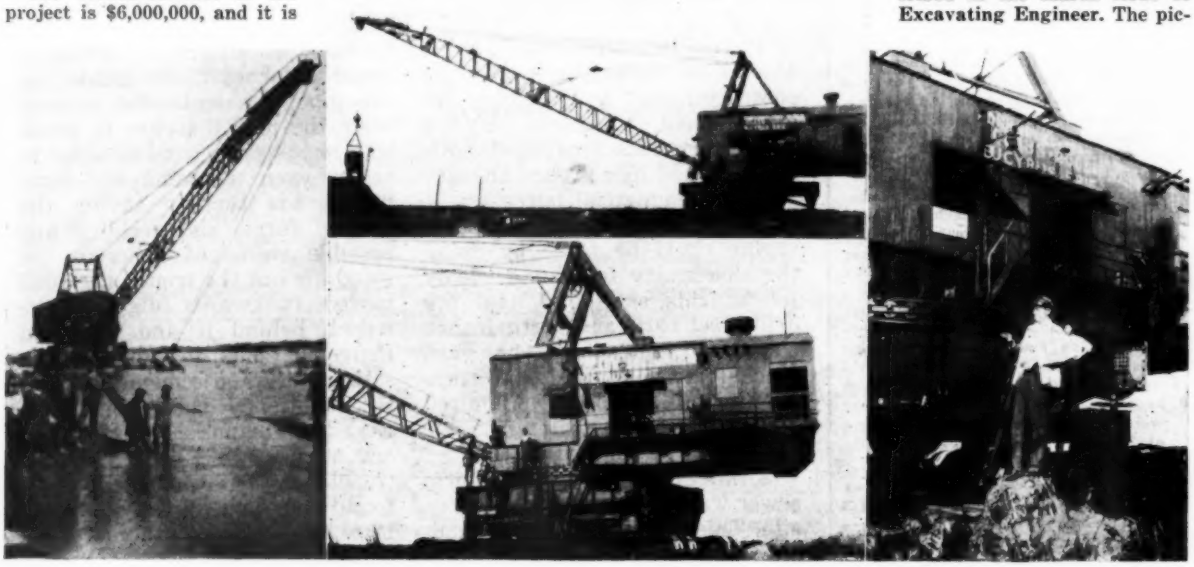
Bids taken on additional Colorado River Aqueduct tunnels

THE Metropolitan Water District of Southern California received bids April 17th on three additional tunnels in the Colorado River Aqueduct. The low bids totaled $7,324,680. Winston Brothers, Los Angeles, bid low with $2,143,799 on the 4½ mile east portion of Iron Mountain tunnel. Utah Construction Company, San Francisco, were low on the 3.1 mile west portion with bid of $1,699,705. Winston Brothers were also low on the 1.6 mile east portion of the Coxcomb tunnel and 1.6 mile west portion with bids of $799,236 and $835,279. J. F. Shea, Incorporated, now headquartering at Boulder City, Nevada, were low on the 3.8 mile Cottonwood tunnel with bid of $928,538 on the east portion and $928,123 on the west portion. The prices given are for the 16-foot diameter tunnels, the alternate plan for a 12 foot-4 inch tunnels being probably abandoned.

Foreign

Greece

From Operator Gregorious Triantafyllon, who runs one of the big Bucyrus-Erie Class 200 Diesel-electric draglines for John Monks and Sons—Ulen & Company on their Struma project in Greece, comes the accompanying group of pictures showing "Siderocastro," as the machine he operates is named, in action. This project was described in the March issue of **Excavating Engineer.** The pic-



Advantages of Style B Flattened Strand (P.F.S.) Construction Over 6x19 Round Strand Construction

It is 10% stronger

It has more than 200% greater wearing surface

It offers greater resistance to "drum crushing"

It will not score drums and sheaves

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Shots From the Firing Line— *Continued*

ture at the left shows the crew working the Siderocastro toward higher land during a flood. There is three to four feet of water over the surrounding countryside. The three operators are all working together to get the machine out of the zone where a further rise of water may tie up the work. Operator Bill Thomakas is holding the ladder, George Bittas and Gregorious Triantafyllon are in the water. In the upper of the center pictures we see Gregorious and his crew piling dirt into a levee 3.15 meters high. Below this is a closer view of the crew. Operator Triantafyllon on the base near the boom foot; Engineman (and apprentice operator) Peter Dolachs at his left on the roller circle; Electrician G. Manglis on the oil drum; Oiler Peter Nutsiaches at his left; while Groundmen H. Lekkas and D. Conmbakis stand on the crawlers. The picture at the right shows Operator George Bittas counting the cycle seconds as he waits for his shift at the controls.

Brazil Notes

By WALTER PORTH

The machine illustrated is a Bucyrus-Erie GA-2 shovel owned by the **Companhia Nacional de Cemento Portland**, a recently established Brazilian

company, organized by International Cement Corp., the well-known owners and operators of numerous cement plants in the United States Cuba, Argentina and Uruguay.

This GA-2 was originally sent to Brazil in 1927 and was used by the Sao Paulo Government on the Rio Claro Aqueduct project near the city of Sao Paulo. It was recently acquired by the Companhia Nacional de Cemento Portland to excavate cuts for the 20 kilometer railway which they are building to connect the quarry proper with the cement mill. In spite of its age, it has been working twenty-four hours a day for the past seven months without shut-down for anything but ordinary adjustments, and is still going strong.

The average output has been 60 dump cars per day, each averaging 10½ cu. yds. per loads, bank measurement. Record output for several days running has been 85 cars per day. This, of course, does not come anywhere near being a record for the GA-2 shovel but the output is limited by the limited number of cars available and the fact that only single track and one train is being used.

Superintendent R. J. Elledge, who is in charge of the construction of the new cement mill of the company which is located near the Bay of Rio de Janeiro just opposite that Nation's beautiful capitol is exceedingly pleased with his GA-2 machine, which, in spite of its age, has enabled him to push the construction of this connecting railway ahead of schedule.

Hawaii

By PERRY H. KRAFT

Bids were asked recently for construction of an asphalt macadam road one and two-tenths miles in length, leading to the Makapau lighthouse. Ditching, grading and culverts are included in specifications.

The new bridge at Kipapaa Gulch will be 485 feet long, of reinforced concrete construction and will be 60 feet high in the center. This is one of eight emergency highway contracts, which at the end of February were employing 1,017 men. Road units on both ends of the bridge employ many men and are not a part of the bridge contract.

Territorial road contracts are under way amounting to $2,700,000 of which $2,200,000 has been made available by the Federal Government. With an early completion of these, nearly 1200 men

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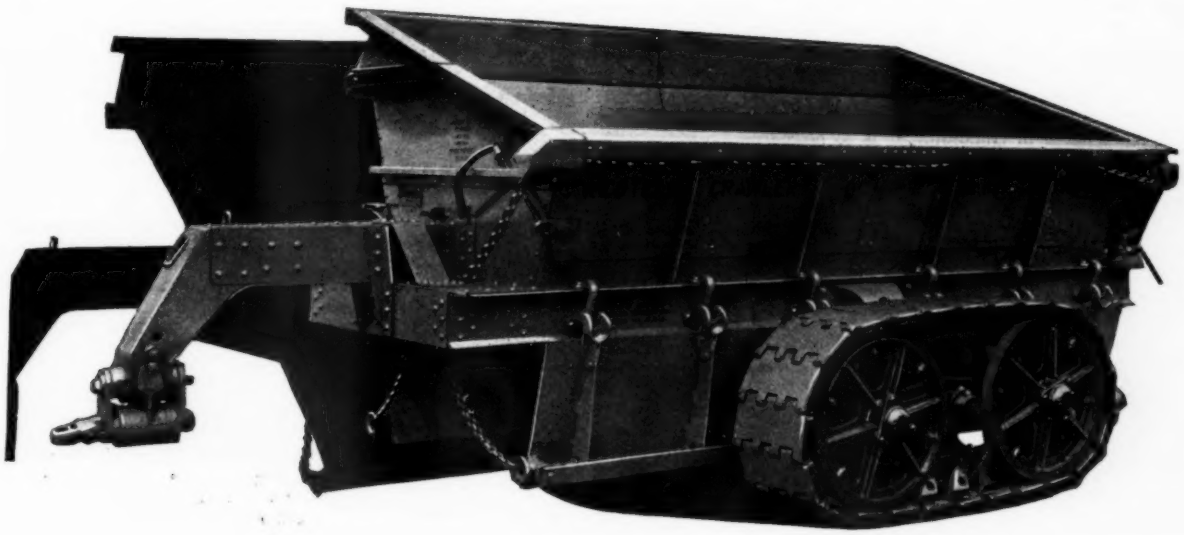

—but this wagon GETS THEM

● The Western 10-13 yard wagon has a wide door opening, steep sides and ample clearance under the rear drawbar. When the loading unit is an elevating grader, the removable top section is unbolted and reversed as shown in the upper illustration. This lowers the left side of the wagon so that the elevator can reach over the top.

● The New Western 10-13 yard Crawler Wagon is a unit that moves dirt at a profit. It carries a heaped load of 13 cubic yards. In it are embodied the features of design and construction that years of experience have proved necessary to economical crawler wagon operation.

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The Western Spring Windup operates the doors of the 10-13 yard wagon. This simple, sturdy device permits either tractor driver or dump man to dump the load and wind up the doors. It acts instantly.

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WESTERN

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Shots From the Firing Line—*Continued*

will be made jobless. $1,285,000 which had been promised by R. F. C. for work at Pearl Harbor, has been canceled. Legislative leaders are evolving new plans to contin e road work, if possible.

A new reservoir of 3,500,000 gallons capacity and costing $75,000, will soon be constructed in Honolulu. It is to be 180 feet above sea level and will benefit water consumers in the low service areas, under 100 feet above sea level.

V. Tsuzuki was awarded the contract for the widening of Diamond Head road. The project will include the excavation of 17,000 yards of dirt. Low bid was $11,926.

Mayor Fred Wright of Honolulu, has requested that $125,000 now available, be used for the installation of sewers. Plans call for the work to be done by relief employment only.

A new road costing $249,000 has been completed at Wahiawa, this Island. Pavement is three inch asphalt macadam, with a five inch macadam base. A new bridge over Kaukonahua gulch with a 210-foot span is a part of the improvement. **L. L. McCandless** was the contractor.

At a meeting of the **Engineering Association of Hawaii**, a resolution was adopted providing a new scale of pay on relief expenditures. On such expenditures proportions should not exceed the following for direct relief: 75% of the total for labor, 20% for materials and supplies and 5% for supervision and overhead.

A new concrete bridge over Nuuanu stream at Queen Street in Honolulu has opened, replacing a wooden affair which had been condemned. It is 150 feet long and has a 55 foot roadway. **Henry Freitas was the builder.** Cost was $60,000.

L. L. McCandless, contractor, is attracting much attention in Washington as Territorial Delegate. His name has been prominently mentioned for governorship of Hawaii.

Canada

British Columbia

JOHN M. MERCER

John M. Mercer, Vice-President of the Northern Construction Company and prominent construction engineer, died at his home in Vancouver, B. C., April 12, age 56 years.

Massachusetts Notes

The Town of Weymouth is installing 6-inch cast iron water mains by day labor. $10,000 has been appropriated to the job.

The Town of Lexington is planning to lay 6-inch sewers in Sargent, Shirley and Tewkbury Streets at an estimated cost of $10,000, also a 12-inch trunk line sewer for $8,000.

DENNIS A. BLAKESLEE

Dennis A. Blakeslee, president of the Blakeslee-Rollins Corp. of Boston, died at his home in New Haven, Conn. on April 5, age 76 years. Mr. Blakeslee has been active in construction work for many years both as head of the Blakeslee-Rollins Corp. and as head of the firm of C. W. Blakeslee & Sons, New Haven, a firm founded by his father.

New Jersey Notes

Plans are being considered for a stone jetty in front of the casino at Deal estimated to cost $100,000.

New York Notes

The New York Central is planning a grade crossing elimination in Schenectady County to cost about $30,000. Also they have revised plans on hand for constructing an overhead crossing at Croton River-Peekskill Highway to cost about $25,000.

The Delaware and Hudson plans a $25,000 grade elimination on the Chazy-Rouses Point-Scotia Highway.

West Shore R. R. Company contemplates eliminating Oak Orchard and Ford Road crossings in Genesee County at costs of $83,500 and $118,300 respectively.

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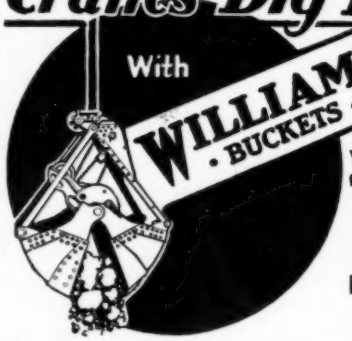

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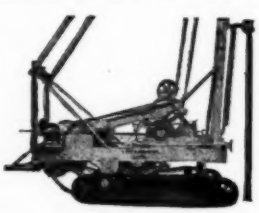

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Shots From the Firing Line— *Continued*

Florida Notes

It is reported that the National Administration is giving consideration to construction of **a ship canal across the upper part of Florida.** Such a canal would probably involve excavation of some 550,000,000 cubic yards. It would save about 800 miles in the round trip Atlantic to Gulf ports.

Ohio Notes

By CLYDE B. DAVIS

Safety-Service Director M. J. Ahner, of Fremont, is waiting only formal approval of cooperation by the Ohio Relief Commission to start an extensive public works program including a dike along the Sandusky River and beautification of the river front.

"How many beats are there to the bar in this piece of music, Dad?"

"Fancy asking a policeman a question like that,' 'said the boy's mother. "If you asked your daddy how many bars there were to the beat, he might have been able to tell you."

Detroit and Vicinity

By CLYDE B. DAVIS

The Michigan administration has offered a bill to make the greater part of the $18,000,000 in state highway funds available for direct welfare relief in the state. The bill was offered reluctantly, to meet the demands of the Reconstruction Finance Corporation.

The bill would amend the Horton Act, passed in the first special session of 1932, to return to the counties the proceeds of the automobile weight tax. The Horton Act directs at length just how this money shall be expended. First is must be used for retirement of covert road bonds. Next is must be used to retire county road and bridge bonds.

These two sections would be allowed to stand under the amendment, but all the remaining funds could be used for retirement of emergency welfare bonds and to supplement local welfare relief and aid extended by the RFC.

Allocation within the bounds of counties would be in the hands of the boards of supervisors, subject to approval of the governor.

Isaac De Young, General Superintendent of St. Mary's Falls Canal, reports that the dredging contract to excavate a 10-mile stretch from the lower end of West Neebish to Lime Island will be let this summer. The channel is to be deepened to 26 feet all the way. It now is 20 to 22 feet, with 50-foot holes in spots.

The H. C. Nelson Co., Muskegon highway contractor, has speeded up work on the four-mile stretch of the Scenic Dune Road between Ludington and Big Sable Point by putting on a night crew of grading operators. Heavy tractors, trailers and shovel have finished the rough grading from the halfway mark to the Hamlin River. The paving is to start about May 1. The road must be completed by July 1.

H. C. Nelson Co., Muskegon, expects to finish to the Hamlin River by April 15 the grading operations for the new scenic drive road at Ludington that is going through to Big Sable Point.

The City Council of Hancock is considering the following spring construction: completing new naval reserve dock, completing and improving the municipal dock, building a lake shore drive from the county bridge along the lake front to the bathing beach, building an athletic field, and improving the municipal bathing beach.

Maj. Albert K. B. Lyman, district engineer at Duluth, will soon have plans ready for the waterworks dredging work at Ontonagon, which is to start in June. Repairs on the pier are to begin in the fall.

An election is to be held soon in Owosso on the proposition to issue bonds for a water softener plant and to complete the 12-inch belt line of water mains.

South Haven's harbor commission has asked Federal relief for harbor congestion and is seeking a channel depth at least two feet below the present 17.9 feet actual, widening of Black River channel from 120 to 130 feet, widening the turning basin to 120 or 150 feet, either an extension of present piers into Lake Michigan or construc-

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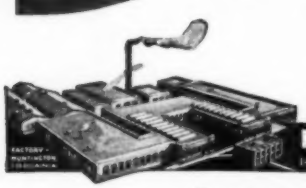

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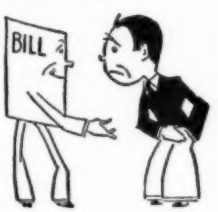

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Shots From the Firing Line— *Continued*

tion of a new breakwater. Approximately 87,000 tons of freight were unloaded in 1932, of which 75,000 tons were wood pulp for the paper mills of Kalamazoo Valley. The tonnage estimate for 1933 is 375,000.

P. T. Mitchell, City Manager of Petoskey, has bought about $3,000 worth of steel and wire to complete the new dam and power house on Bear River. He plans to measure the flow of water from July 1, 1933, to July 1, 1934, as a basis for a storage reservoir which is to be built. The city owns a dam site a few miles up the river.

The Village Council of Shelby is purchasing a 100-foot right-of-way to relocate M-82A at the east village limits. Work is to start soon. Crews also are at work grading and widening South Ferry Road and two sections of M-82 in that district.

The State Highway Department has started to buy a right-of-way for the Huron Shore Highway from Alpena north to Presque Island county line, about 11½ miles through a heavily wooded section.

The Monroe City Engineer's Department, working many months with Hood, Decker, Shoecraft and Drury, Ann Arbor engineers, has drafted a complete plan for eliminating sanitary sewage from the River Raisin and work is to be started at once by Stuart M. Weaver, city engineer, using welfare labor as far as possible. A large interceptor sewer is to be built along the banks of the river to pick up the city's sanitary sewage. The storm water will go to a separate system, emptying directly into the river. The embankments will be graded. The plan looks to eventual building of a disposal plant, as ordered by the State Stream Control Commission because of pollution of the river and lake.

The State Highway Department has let a contract for $4,864 to O. L. Raymond, of Escanaba, to grade and drain .77 mile on US-2 from Powers north, and for $15,650 to the Bridge Maintenance Division to reconstruct the M-29 bridge at St. Clair.

By H. H. BUCHANAN

Alpine Excavating Company, Detroit, is about completed on their grading project near Cadillac. They have had splendid success in yardage performance with their Bucyrus-Erie GA-2 shovel (1¼-yard capacity) under the direction of Mr. Calcaterra.

Indiana Notes

Indianapolis has begun a $140,000 street widening, reconstruction and resurfacing job which is the beginning of a large 1933 program, following approval by the Board of Public Works of the $140,000 section, which includes main thoroughfares in the south and west parts of the city. Where the streets are widened the city pays half and the property owners half; where they are resurfaced the city pays three-fourths of the total.

Kentucky Notes

Thomas Allen of Bradenburg writes that he is looking for a chance to sub on grading jobs—says he is equipped to handle jobs up to 100,000 cubic yards.

By W. E. CHAMBERS

F. C. Gorrell & Sons of Russellville were awarded paving of 26 miles of the Flemingsburg-Morehead Road on their bid of $390,593.

The State Highway Commission rejected all bids for grading and draining 7.3 miles of Mannsville-Bradfordsville road in Taylor and Marion Counties and set aside $42,861 to do the work with State Highway employees and equipment.

W. M. Hill & Sons of Fulton were awarded two bridges and earth approaches on the Scottsville-Franklin Road in Allen County for $45,725.

J. B. Westerfield of Owensboro was awarded 6.1 miles of grading and draining on the Russellville-Morgantown Road in Butler County for $32,635.

H. F. Mathis of Bardstown secured the surfacing of 9.1 miles on this same highway in Logan County on bid of $22,885.

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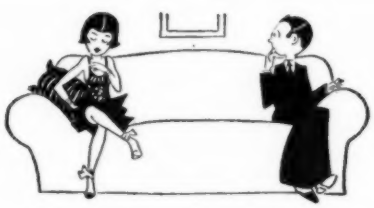

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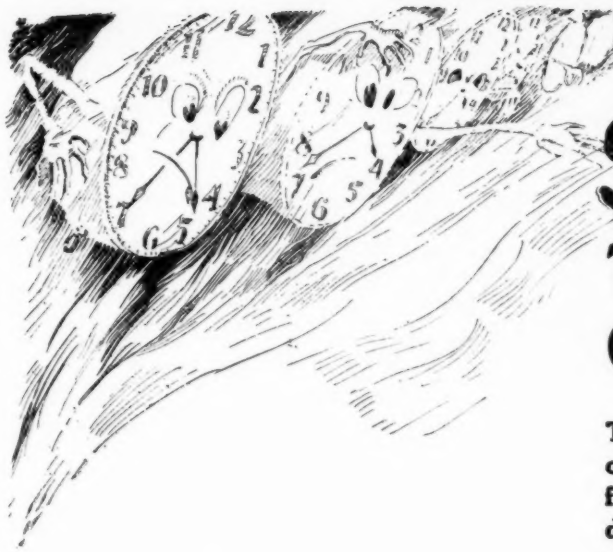

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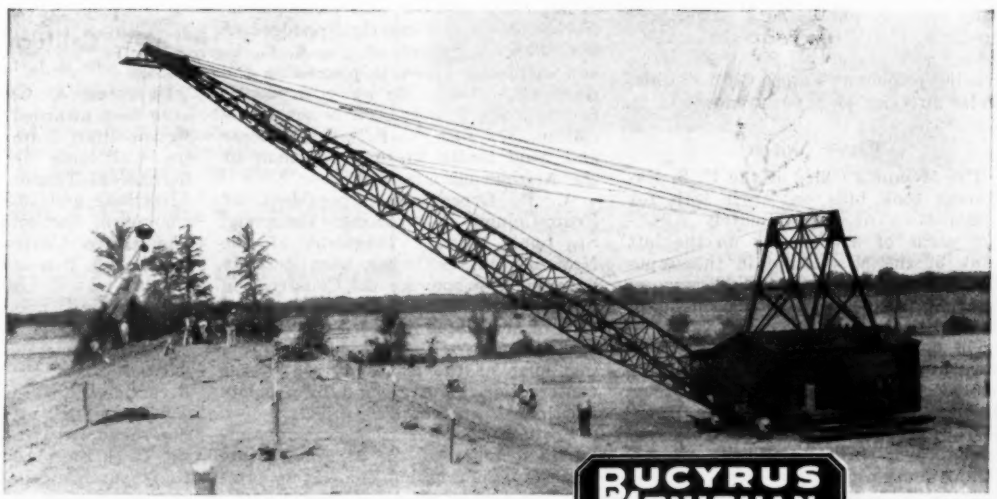

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Shots From the Firing Line—*Continued*

Illinois Notes

By H. H. BUCHANAN

Clark, Kearney & Stark, grading contractors, Rockwood, have their Bucyrus-Erie GA-2 shovel on their project at Sayresville, Kentucky. They also have a large grading project going at Lesterville, Missouri.

A. F. Beckman Construction Company, Glen Ellyn is finishing the grading project at Smithfield, with a Bucyrus-Erie Type "B" steam shovel and moving to their Henderson County project at Gladstone.

The Department of Public Works and Buildings at Springfield is taking bids until May 5th covering two grading sections, one of 17,400 cubic yards on .13 miles near Decatur in Macon County and on the other of 29,535 yards on .33 miles near Golf in Cook County.

Minnesota Notes

By H. H. BUCHANAN

W. W. Magee Company, St. Paul, has several projects well under construction in Minnesota. A large fill is nearly completed on the Wawina to Floodwood project. They have also worked throughout the winter on their Grand Marais North project which borders Lake Superior. There is one more link to be awarded, completing this road from Two Harbors to Canadian line. This is one of the most scenic highways in the state. On the Wawina job they have their new Bucyrus-Erie 37-B 1½-yard shovel, a Bucyrus-Erie D-2 Diesel dragline and two Osgood crane and dragline machines. At Grand Marais they are operating their two Marion 37 steam shovels and an Osgood 1-yard shovel.

S. J. Groves & Sons have resumed their grading project at Custer, South Dakota, with their new Bucyrus-Erie 43-B 1¾-yard shovel, under the direction of Superintendent L. J. Klock. They recently purchased a new Bucyrus-Erie 37-B Diesel Dragline (1¾-cubic yard capacity) for their large grading project at Haines City, Florida, under direction of Superintendent C. D. Walter.

River Notes

The Memphis Office of the U. S. Engineers took bids on April 18th for construction of approximately 5,843,000 yards of earth work on the left bank of the Mississippi in the upper Yazoo levee district. Low bidders were: **Matthews Brothers Construction Co.** of Erie, Illinois 805,000 cubic yards at 12.7c per yard; **Harris and Brandenburg** of West Memphis, Arkansas 405,000 at 10.5c per cubic yard; **Forcum James Company of Dyersburg**, Tennessee 400,000 cubic yards at 13.5c per cubic yard; **Brooks-Callaway** of Atlanta, Georgia 2,293,000 cubic yards at 11c and 1,155,000 cubic yards at 10.5c per cubic yard; **Chas. W. Greeson** of Opelousas, Louisiana 785,000 cubic yards at 11.98c per cubic yard.

St. Louis and Vicinity

By A. J. KOENIG

Contracts for paving widened Market street in St. Louis were awarded by the Board of Public Service. The work was let in three sections as follows—Between Twentieth and Jefferson avenues to **Central Paving and Construction Company** at $59,760. Jefferson to Grand avenue, and Grand to Vandeventer, **Bridges Asphalt Company**, for $183,205 and $84,424, respectively. The bids were slightly above the City Engineer's estimate. Previous bids were about 20 per cent under the City's estimate.

E. O. Sternberg was low with a bid of 9.34 for constructing 23,000 cubic yards earth work on right bank Miller No. 2, Red River and 7.9c cubic yard for 127,000 cubic yards Garland Levee District.

A. L. Cook, Ottawa, has contract for constructing earthwork and culverts in Rooks county, Kansas.

Ziegler Construction Company was awarded contract for paving 12.5 miles in Lonoke County, Arkansas at $235,570. **Hardaway Construction Company** has contract for 5.5 miles bituminous paving in Lawrence county at a price of $102,687.

Wills & Cornelli Construction Company were awarded contract by the U. S. Engineer, St. Louis, for 1,150,000 cubic yards levee work in Hillview Drainage District.

Minneapolis Dredging Company has contracts for dredging 1,145,000 cubic yards in the Illinois River at 8.127 cents cubic yard.

Missouri Notes

By H. H. BUCHANAN

C. P. O'Reilly, president of the Company bearing his name, Wainwright Building, St. Louis, has now definitely retired from active construction work. For many years he has been prominent as highway grading and paving contractor. He was formerly President of the Missouri Branch of the A. G. C. and extremely active in promoting the Association work. He was also identified with the Illinois Contractors Association. We wish "C. P." every success and good health in the enjoyment of the Arizona climate.

A. P. Greensfelder, president of Fruin-Colnon Contracting Company, St. Louis, former President of the National A. G. C. has been actively engaged in promoting the Construction Council at St. Louis. This council consists of associated industries in the city of St. Louis for the purpose of opposing some of the issues averse to the construction industry and to promote legitimate constructive projects.

Scott Wilson, Ferguson, was appointed as member of the Missouri State Highway Commission and his appointment was confirmed by the Missouri State Senate March 13th. Mr. Wilson is widely known throughout the State of Missouri and has long been active in promoting good roads.

Colorado Notes

By H. M. BIBAUD

Reorganization of the State Highway Department to meet the needs of the financial emergency will become necessary soon in Colorado according to a statement made by Governor Johnson, April 11th. The 1932 expenditures in Federal Aid and State construction totaled $4,293,000 where the total 1933 revenue will not exceed $3,666,000 unless some form of emergency Federal Aid is passed by Congress. Deducting for maintenance and incidentals from the above fund will leave only $1,800,000 for actual construction work. A meeting of the State Highway Advisory Board will be one of the first moves of the new economy program. The nine engineering and maintenance districts will be cut to two or three, according to the Governor's statement, while the number of district engineers will probably be reduced to one or two.

Order from Washington notifying the United States Bureau of Public Roads here, that it will not be permitted to concur in awarding contracts for Federal Aid emergency projects that were not already contracted for by March 22nd, will not affect to any great extent Colorado's Federal Aid projects, Junius W. Johnson, District Engineer of the Bureau is quoted as saying. Mr. Johnson stated that the emergency program has contracts for $289,500 worth of work. Much of the work is already under construction, but some of it was delayed because of adverse weather conditions. In addition Colorado has about $900,000 for extra improvements in connection with the emergency program. In accordance with the order, the State Highway Department has suspended the letting of new contracts. A vigorous protest against the action was sent by Governor Ed C. Johnson to Senator E. P. Costigan, declaring that suspension of work was a direct blow at the relief program as outlined by the state.

California Notes

By H. L. LIVINGSTON

Hamilton & Gleason of Redlands have been awarded the contract by the Metropolitan Water District of Southern California for constructing the Bernasconi Tunnel. This tunnel is 1.1 miles long and 15'3" in diameter. The amount of the contract was $412,055. **The Dravo Contracting Company** of Pittsburgh, Pennsylvania, who bid $3,136,603 was awarded the contract for the construction of the Valverde Tunnel. This tunnel is 7.2 miles long and 15'3" in diameter. These tunnels are located about 10 miles southeast of Riverside, California.

The Guy F. Atkinson Company of San Francisco was the low bidder to the U. S. Engineers' Office of Portland for repairs to the south jetty at the entrance to the Columbia River. The amount of their bid was $1,686,403.

This project involved the placing of 1,200,000 tons of rock.

Healy-Tibbitts Construction Co. of San Francisco who bid $1,036,500 were low bidders to the San Francisco-Oakland Bay Bridge for Contract No. 3. This contract is for the San Francisco Anchorage and includes the approach from the bridge to the top of Rincon Hill.

The Clinton Construction Company of San Francisco who bid $1,821,292 was low bidder to the San Francisco-Oakland Bay Bridge for Contract No. 5, which is the Yerba Buena Island Crossing, with the exception of the steel superstructure but including the tunnel.

Among the future contracts scheduled to be let this year on the San Francisco-Oakland Bay bridge are: mole construction and waterfront grading, $1,200,000; substructure and girder spans on mole, $200,000; moving buildings on Yerba Buena Island, $50,000. These are set for award July 1st. Next year's contracts will include demolition of the San Francisco section and the Southern Pacific Underpass. Various other contracts will follow in 1935 and 1936 for approaches, viaducts, buildings, paving, etc.

W. B. Boggs, District Engineer, has completed specifications for the **Broadway Low Level Tunnel and connecting roads** in Alameda County and Contra Costa County and the adoption of these specifications by the Board of Directors of the Joint Highway District is expected shortly, after which bids will be called—for the construction of the tunnels and roads. These tunnels will be parallel twin tunnels 3,168 feet long, 34′ diameter with concrete linings from two to five feet thick and each tunnel will contain a 22 ft. roadway and a 3-ft. sidewalk. The approach roads will be 2.2 miles long, 60 ft. wide with 40′ macadam or concrete surfaces and 10′ shoulders. This work will involve 1,100,000 cu. yds. of tunnel and roadway excavation and 82,000 cu. yds. of concrete. The estimated cost of this work is $3,753,000.

Basich Bros. of Torrence have been awarded contract by the California Division of Highways for 3.3 miles of grading and concrete paving between San Francisco and South San Francisco. The amount of their bid was $166,161.

The Hanrahan Company of San Francisco who bid $59,959 to the California Division of Highways was awarded the contract for 3.2 miles of grading and surfacing between Manila Ranch and Bartlett Springs Road in Lake County. This contract involves about 45,000 cu. yds. of roadway excavation.

Los Angeles and Vicinity

By D. E. BANKER

Atlas Construction Company of Pasadena was awarded a contract on March 27 by the Los Angeles County supervisors for construction of a railroad grade separation structure in Arcadia, California. Cost of the construction is $19,600. The project entails construction of a highway subway under the Santa Fe tracks, to connect Orange avenue and Colorado street, the total length of the subway to be about 900 feet, with a steel superstructure 80 feet in length, and width of the street 40 feet. Contract for the steel superstructure will be let by the Santa Fe railway company while the county will let that for the subway portion.

Graham Brothers, Long Beach, received the sub-contract for all excavation and rip-rap work for the Second street bridge across the San Gabriel river at Long Beach. Contract was approved by the Los Angeles County board of supervisors on March 27. General contractors for the bridge work are E. S. McKittrick and J. E. Burrell.

H. W. McKinley, Los Angeles, started work early in April on grading approximately four miles of 20-foot service or access road to the Potrero shaft of the San Jacinto tunnel, the job involving about 19,500 cubic yards of excavating. He was awarded the contract at $5,850 by Wenzel and Henoch Construction Company, general contractor for the tunnel. At an additional price of 32 cents per cubic yard the four-inch disintegrated granite surfacing was to be placed.

SAUERMAN

CRESCENT HYDRAULIC SCRAPER

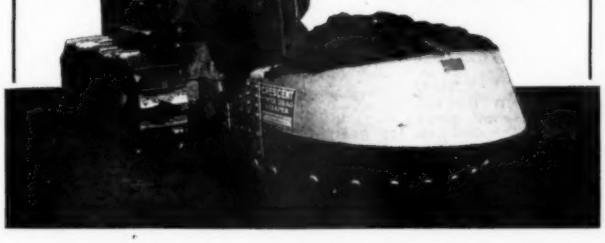
Hitch a Crescent Hydraulic Scraper to a tractor and you have a powerful excavator that can't be beat for moving dirt distances of a few hundred feet.

This scraper has the same great strength and light weight in relation to capacity that have made "Crescent" buckets so effective in the familiar cable-drawn operation. The curved wearing blade has a continuous ploughshare action and the scraper *digs* rather than *scrapes* its loads.

The scraper is dumped—without stopping the tractor—by simply transferring the pull from the bottom to the top of the bucket by means of a hydraulic plunger. The depth of digging or of dumping is controlled at will.

There is a size of Crescent Hydraulic Scraper for every size and make of tractor. Write for specifications and prices on this wonderful dirt-mover.

SAUERMAN BROS., 474 S. Clinton St., CHICAGO



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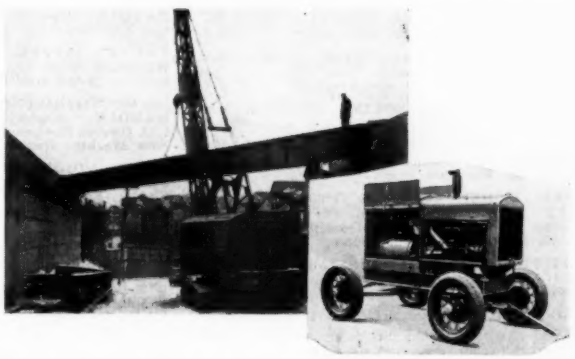
Welded Highway Bridges Another Source of Profit



P & H-Hansen Arc Welders are at work fabricating bridges—and adding to contractors' profits—on many of the new bridges going in on secondary road projects throughout the country. P & H-Hansen Welders are extremely simple to operate—light, compact and easily portable—designed for a wide variety of work. Write for data on this highly profitable welding unit.

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AMERICA'S FINEST FASTEST WELDER

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★ ★ ★ AS ADDITIONAL SERVICE to the industry of excavation, Excavating Engineer lists below a large number of equipment bargains available at the present time. Some of this equipment is new, some has been rebuilt by the manufacturer and some is just plain used. We believe that each item represents a bargain for the man who has use for that particular type of equipment. Send us a postal card or letter, giving reference number and we will pass the inquiry right on to the owner. *Address all inquires to Bargain Counter,* Excavating Engineer, South Milwaukee, Wisconsin. *Good Values—Very Low Prices*

SHOVELS CRANES DRAGLINES

P&H MODEL 208—45′ BOOM DRAGLINE Cats—15½′ long, 9′ wide, 22″ Treads. 100 HP. Waukesha High Alt. Engine. SCD-1.

BUCYRUS-ERIE REBUILT TYPE B HIGH LIFT STEAM SHOVEL. Excellent condition. Clamshell equipment available. SCD-2.

AMERICAN 1 CU. YD. GASOLINE SHOVEL. Motor overhauled 1932. Good value. SCD-3.

P&H MODEL 600—40′ BOOM CLAMSHELL. Waukesha 75 HP. Engine. New 1929. Dragline and Shovel equipment also available. SCD-4.

ORTON ⅝ YD. GASOLINE SHOVEL. New 1928. Make an offer. SCD-5.

BUCYRUS-ERIE TYPE B-2 HIGH LIFT STEAM SHOVEL. Cat Mounting. Excellent condition. Very low price. SCD-6.

P&H MODEL 600. New 1929. 20′ Boom, 14′3″ Dipper Handle, 1 cu. yd. Dipper. Waukesha 75 HP. Engine. Dragline and Clam Shell Equipment also available. SCD-7.

WILFORD OR UNIT MODEL B GASOLINE SHOVEL. ¾ swing, ⅝ cu. yd. Dipper. New 1928. Excellent condition. SCD-8.

BUCYRUS-ERIE MODEL 30-B DIESEL —25 9″ Boom, 14′ Dipper Handle, 1 yd. Dipper. SCD-9.

BAY CITY TRACTOR TYPE—CHAIN CROWD —¾ YD. SHOVEL. Cat Mounted. McCormick-Deering Power Unit. Excellent condition. SCD-10.

REBUILT BUCYRUS-ERIE TYPE B HIGH LIFT STEAM SHOVEL. Cat Mounted. New machine guarantee. SCD-11.

LINK BELT 1 CU. YD. GAS SHOVEL. 22′ Boom, 16′ Dipper Handle. Waukesha JL 6″x7″ Motor. Good operating condition. SCD-12.

MONIGHAN MODEL 1-W, WALKER — 60′ Boom Dragline, 1¼ cu. yd. Page Bucket. Good condition. SCD-13.

P&H MODEL 600—40′ BOOM DRAGLINE. Waukesha 75 HP. Engine. New 1929. Shovel and Clamshell Equipment also available. SCD-14.

BAY CITY TRACTOR TYPE CLAMSHELL. NEW 1928. Excellent condition. Shovel Equipment also available. SCD-15.

COMPLETE FRONT END EQUIPMENT

Shovel Equipment

¾ CU. YD. DIPPER—20′6″ BOOM—13′ DIPPER HANDLE—High Lift Rope Crowd Shovel Equipment suitable for Models 1030 or 1035. **Brand New.** SE-1.

⅝ CU. YD. DIPPER—23′ BOOM—15′ DIPPER HANDLE—Extra High Lift Rope Crowd Shovel Equipment suitable for Models 1030 or 1035. **Brand New.** SE-2.

1 CU. YD. DIPPER—26′ BOOM—15′ DIPPER HANDLE—Rope Crowd Shovel Equipment suitable for Model D-2. **Brand New.** SE-3.

1 CU. YD. DIPPER—23′ BOOM—12′6″ DIPPER HANDLE—Rope Crowd Shovel Equipment suitable for Model D-2. **Brand New.** SE-4.

1¼ CU. YD. DIPPER—25′ BOOM—17′ DIPPER HANDLE— Slightly Used Rope Crowd High Lift Shovel Equipment suitable for Model 37-B. **New Machine Guarantee.** SE-5.

1½ CU. YD. DIPPER—23′6″ BOOM—15′ DIPPER HANDLE—Slightly Used Rope Crowd Shovel Equipment suitable for Model 37-B. **New Machine Guarantee.** SE-6.

Clamshell Equipment

30′ BOOM COMPLETE EQUIPMENT INCLUDING ROPES. Suitable for Models 1020 or 1025. **Brand New.** CS-1.

35′ BOOM COMPLETE EQUIPMENT INCLUDING ROPES. Suitable for Models 1020, 1025 or 21-B. **Brand New.** CS-2.

40′ BOX BOOM CLAMSHELL EQUIPMENT INCLUDING ROPES. Suitable for Model D-2. **Brand New.** CS-3.

Dragline Equipment

35′ BOOM, FAIRLEAD AND ROPES; but not including bucket. For use on Models 1020, 1025 and 21B. DL-1.

35′ CHANNEL BOOM, FAIRLEAD AND ROPES but not including bucket. For use on Model D-2. DL-2.

40′ CHANNEL BOOM, FAIRLEAD AND ROPES, but not including bucket. For use on Model D-2. DL-3.

40′ BOX BOOM, FAIRLEAD AND ROPES, but not including bucket. For use on Model D-2. DL-4.

45′ BOX BOOM, FAIRLEAD AND ROPES, but not including bucket. For use on Model D-2. DL-5.

Lifting Crane Equipment

35′ BOOM AND ROPES, and 10 ton Dobie Block. Suitable for Models 1020 or 1025. **Brand New.** LC-1.

30′ BOOM AND ROPES, including one 10 ton Dobie Block. Suitable for Models 1020, 1025 or 21B. **Brand New.** LC-2.

Trench Digging Equipment

½ CU. YD.—36″ WIDE SOLID TYPE DIPPER, 18′ Boom, Dipper Handle and all auxiliary equipment for application to **Model 1020.** Will dig to maximum depth of 16′. DS-1.

¾ CU. YD.—36″ WIDE SOLID TYPE DIPPER, 18′ Boom, Dipper Handle and all auxiliary equipment for application to **21-B.** Will dig to maximum depth of 16′. DS-2.

¾ CU. YD.—36″ WIDE SOLID TYPE DIPPER, 21′ Boom, and all auxiliary equipment for application to **Model 1030.** Will dig to maximum depth of 18′. DS-3.

1 CU. YD.—42½″ WIDE SOLID TYPE DIPPER, 21′ Boom, and all auxiliary equipment for application to **Model 32-B.** Will dig to maximum depth of 18′. DS-4.

1 CU. YD.—42½″ WIDE SOLID TYPE DIPPER, 24′ Boom, and all auxiliary equipment for application to **GA-2 Shovel.** Will dig to maximum depth of 22′. DS-5.

1 CU. YD.—42½″ WIDE SOLID TYPE DIPPER, 24′ Boom, and all necessary auxiliary equipment for application to **GA-3 Shovel.** Will dig to maximum depth of 22′. DS-6.

All of the above equipment of Bucyrus-Erie manufacture.

BRAND NEW PAGE, two dippers each ¾ cu. yd., one 38″ wide over cutters, the other 49½″ wide over cutters. 17′-1½″ Boom and all necessary auxiliary equipment. Will fit Bucyrus-Erie 1030, 1035 or 32-B. DS-7.

CAT MOUNTINGS

Give that Old Traction Wheel Machine a New Lease on Life

1 REBUILT SPUR GEAR CAT MOUNTING—Interchangeable with Type B or Type B-2 Bucyrus-Erie traction wheel or cat mounting. CM-1.

ain Counter ★ ★ ★

DIPPERS and BUCKETS

Dippers—Large Machines

1 2½ CU. YD.—Front 2½" Molybdenum Cast Steel, two part Van Port Reversible Teeth. **Brand New.** Can be used on Model 75-B, 68-C, 70-C Machines. D-1.

2 3 CU. YD.—Front 2½" Molybdenum Cast Steel, two part Van Port Reversible Teeth. **Brand New.** Can be used on Model 100-B, 68-C, 70-C Machines. D-2.

1 3½ CU. YD.—Front 2¾" Nickel Chrome Steel, two part Van Port Reversible Teeth. **Brand New.** Can be used on Model 88-C, 95-C, Class 180. D-3.

1 4 CU. YD.—Front 2¾" Molybdenum Cast Steel, two part Van Port Reversible Teeth. Has seen some service but in good condition. Can be used on Model 100-C, 120-B. D-4.

1 4½ CU. YD.—Lip 2¼" Manganese Steel, two part Reversible Manganese Teeth. **Brand New.** Can be used on Model 88-C, 110-C. D-5.

1 8 CU. YD.—Front Molybdenum Steel, two part Van Port Reversible Teeth. **Slightly used** but excellent condition. Can be used on Model 320-B. D-6.

Clamshell Buckets

1 ¾ CU. YD. WILLIAMS "FAVORITE" without teeth or counterweights. **New.** CB-1.

1 1 CU. YD. WILLIAMS "FAVORITE" with teeth and counterweight. **Brand New.** CB-2.

1 1¼ CU. YD. WILLIAMS "FAVORITE" with teeth. **Brand New.** CB-3.

1 2 CU. YD. WILLIAMS "FAVORITE" without teeth. **Brand New.** CB-4.

Dragline Buckets

2 ¾ CU. YD. CLASS "C" PAGE. New. DB-1.

2 1 CU. YD. CLASS "C" PAGE. New. DB-2.

1 1½ CU. YD. CLASS "C" PAGE. New. DB-3.

3 2 CU. YD. CLASS "C" PAGE. New. DB-4.

1 2 CU. YD. OMAHA STANDARD. New. DB-5.

2 2 CU. YD. BUCYRUS-ERIE TYPE "U" RED ARCH. Rebuilt. DB-6.

Ask for our special prices.

AIR COMPRESSORS

2 11"x11"x12" STEAM DRIVEN LOCOMOTIVE TYPE, Westinghouse air comoressors with fittings. Brand New. AC-1.

2 11"x11"x12" STEAM DRIVEN LOCOMOTIVE TYPE, Westinghouse air compressors with fittings. Used. Make offer. AC-2.

BOILERS

BRAND NEW

Will Make That Old Shovel Work Like New.

Can Also Be Used for Miscellaneous Service.

Vertical Type

9 36"x82½"—26 H.P.—142 lb. Working Pressure. Mass. Std. Will fit Type A. B-1.

4 42"x88"—35 H.P.—144 lb. Working Pressure. Mass. Std. Will fit Type B Shovel. B-2.

1 44½"x88½" fitted with extended fire box for burning wood. Can be used for coal or coke. 37 H.P.—144 lb. Working Pressure. ASME Std. Can be installed on Type B Shovel. B-3.

1 44½"x88½"—37 H.P.—145 lb. Working Pressure. Canadian Std. Will fit Type B Machine. B-4.

2 44½"x88½"—37 H.P.—147 lb. Working Pressure. Mass. Std. Will fit any Type B B-5.

1 46"x7'3"—34 H.P.—125 lb. Working Pressure. Mass. Std. Will fit any 20-B Machine. B-6.

1 46½"x88½"—37 H.P. 150 lb. Working Pressure. Special Wood Burning. Mass. Std. Will fit any B-2 or B-3 Machine. B-7.

2 46½"x88½"—37 H.P.—150 lb. Working Pressure. Mass. Std. Will fit B-2 or B-3 B-8.

3 46½"x110"—40 H.P.—155 lb. Working Pressure. Special Wood Burning Fire Box. ASME Std. Will fit any B-2 or B-3 B-9.

1 48"x7'10"—52 H.P.—150 lb. Working Pressure. Mass. Std. Will fit any 31-B B-10.

1 54"x100"—41 H.P.—125 lb. Working Pressure. ASME Std. Will fit B-2 or B-3. B-11.

2 58"x7'9"—70 H.P.—150 lb. Working Pressure. Mass. Std. Will fit 42-B Machine. B-12.

Locomotive Type

3 44"x17'—75 H.P.—125 lb. Working Pressure. ASME Std. Will fit Model 68-C. B-13.

1 44"x18'—88 H.P.—125 lb. Working Pressure. ASME Std. Will fit Model 70-C B-14.

1 54"x9'7"—70 H.P.—125 lb. Working Pressure. Canadian Std. Will fit Model 50-B Machine. B-15.

2 54"x11'3"—92 H.P.—125 lb. Working Pressure. ASME and Mass. Std. Will fit Model 50-B Machine. B-16.

1 54"x18'—127 H.P.—140 lb. Working Pressure. ASME Std. Will fit Model 103-C B-17.

LIGHTING PLANTS

1 1 KW MOON TURBO STEAM GENERATOR for Lighting Plant. 32 Volt. New. LP-1.

1 1 KW MOON TURBO STEAM GENERATOR for lighting Plant. 110 Volt. New. LP-2.

1 1 KW MOON TURBO STEAM GENERATOR for Lighting Plant. 110 Volt. Used. LP-3.

1 1¼ KW DELCO LIGHTING GENERATOR Non-Battery type. 110 Volt. New. LP-4.

Prices very attractive

ENGINES

Designed especially for application to Excavating or similar Equipment. Can be used for stationary or semi-stationary service.

Diesel

15 BRAND NEW NON-REVERSIBLE ATLAS DIESEL ENGINES—4-cylinder, 7" bore x 8½" stroke, 75 HP at 600 RPM, 4 cycle, Vertical—valve in head type. Includes radiator, fan, auxiliary air compressor, tank and fittings, fuel tank with pipe and fittings. Also mounted on structural base for portable use. DE-1.

2 BRAND NEW NON-REVERSIBLE ATLAS DIESEL ENGINES—5-cylinder, 9" bore x 10½" stroke, 150 HP at 450 RPM, 4 cycle, Vertical—valve in head type. Dust proof, Oil tight crank case and forced lubricating system. Full equipment. Also auxiliary air starting equipment. DE-2.

1 SLIGHTLY USED NON-REVERSIBLE ATLAS DIESEL ENGINE—3-cylinder, 6½" bore x 8½" stroke, 45 HP at 600 RPM, 4 cycle, Vertical—valve in head type, Dust proof. Enclosed oil tight crank case and forced lubricating system. Excellent operating condition. Will demonstrate. DE-3

Steam

1 12½"x16" link reversing type for Railroad Shovel. ME-1.

2 4½"x5" reversible—20.8 HP at 400 RPM. 100 lb. Pressure. ME-2.

1 4¾"x5" reversible—23.2 HP at 400 RPM. 100 lb. Pressure. ME-3.

2 5"x5" reversible—25.6 HP at 400 RPM. 100 lb. Pressure. ME-4.

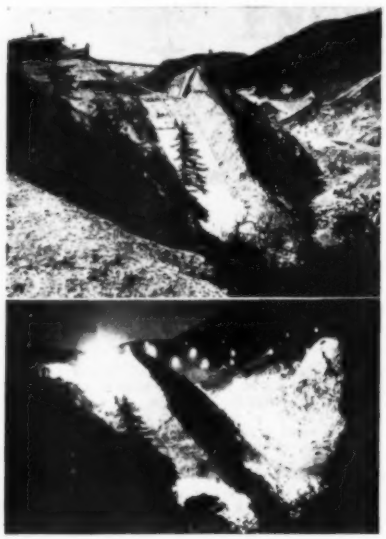
1 "LITTLE TUGGER" INGERSOLL RAND STEAM HOIST ENGINE No. 1-H-5-2½ H.P. ME-5.

Address all inquiries to Bargain Counter, Excavating Engineer, South Milwaukee, Wisconsin

SAN GABRIEL No. 2 — a Rock Fill Dam of Unusual Interest

(Concluded from Page 188)

sand washer and a three-quarter yard shovel for digging gravel.



Above: The spillway in construction with the excavation completed. Concrete was mixed on the top of the hill and chuted down into the forms below. Below: A night scene showing the illumination from lights strung across the canyon. To the left is the spillway with the rock fill dam on the right.

Four classes of aggregate are supplied and transported to the dam site where concrete is mixed with a one-yard cone mixer.

The domestic water supply is taken from the west fork of the San Gabriel River and the water used for drinking and cooking is chlorinated. The sanitary system is complete in every detail with septic tanks and chlorination treatment given all waste disposal. The normal employment consists of 225 men.

A combination of good organization, well planned operating methods and good equipment has kept the job at San Gabriel No. 2 running well ahead of the time limit. Even with the considerable preliminary work that had to be done before actual construction could be started, the project will be completed several months in advance of the contract date. Macco-Lewis, Incorporated, started during April 1932 and had their roads built, camp erected and all preliminary work finished so that work on the dam itself could be started by July. The

Gopher holing with air drill, 1¼-inch steel, depth to 40 feet. These bottom holes help the well drills with their 250 to 285 foot vertical holes pull down the bank and secure favorable breakage.

project was scheduled for two years but actual completion is expected by Thanksgiving of this year. The work is, at this writing, about fifty per cent finished with the slower portion now out of the way.

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THE KOENIG LABOR AGENCIES

Established 1875

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KANSAS CITY
501 Delaware St., Main 0796

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SHOVEL AND DRAGLINE OPERATOR

Eighteen years' experience on nearly all makes and sizes of draglines, including steam, gasoline, electric and Diesel. 43 years of age. Principal experience in connection with levee building. Glad to furnish references. Available for work immediately. Will work any place in the U. S. Box 5508.

EXPERT DRAGLINE AND SHOVEL OPERATOR

16 years' experience as shovel operator. Married, 36 years of age. Have operated practically all makes of machines, and have 10 years' experience as dragline operator. Can handle steam, Diesel, electric or gasoline machine. Have worked on highway and railroad grading, rock excavation in quarry, drainage and irrigation and dredging and also gold dredging. Prefer position on Bucyrus-Erie E-2, D-2, or 50-B or other Bucyrus-Erie machines. Have also operated Class 220 and 225 electric and Diesel electric machines. Capable of taking charge of repairing and erecting and can handle crews. Best of references and can do own repairing. At present located in California, but will go anywhere. Box 5507.

DRAGLINE-SHOVEL OPERATOR

Have 18 years' experience on drainage and highway work. Will go anywhere in U.S.A. Married. Can do own repair work and furnish reliable references. Present location, Florida. Box 5302

SHOVEL OPERATOR

Experienced gas or steam shovel operator on grading, cutting slopes and highway construction. Work desired on any type small machine anywhere in U. S. A. Can do own repairing and furnish good references. Available immediately. Box 5506.

SHOVEL OPERATOR

34 years' experience on Bucyrus, Osgood, Thew, Erie, Marion, Bay City steam or gas machines in rock quarry, Coal stripping, R. R. ditching and grading. Can do own repairing and furnish excellent references. Married. Present location West Virginia. Box 5505.

DRAGLINE-CLAMSHELL-SHOVEL OPERATOR

Have 20 years' railroad, quarry, drainage, levee and highway experience operating Bucyrus-Erie and Northwest shovels and draglines, gasoline, steam, Diesel and electric machines. Willing to go anywhere on any machine. Can furnish good references and do own repair work. Married. Present location, Indiana. Box 4101.

DRAGLINE—SHOVEL—CRANE OPERATOR

Have 100% rating in Federal Civil Service examination. 22 years' experience on drainage, quarry, highway grading and mine stripping. Will go anywhere in U. S. A. Can do own repair work and furnish excellent references. Married. Present location South Dakota. Box 5503.

DRAGLINE—SHOVEL OPERATOR

Experienced on Diesel, gasoline and steam machines on highway and drainage operations. Prefer operating a Diesel machine anywhere. Can do own repair work. Married. A-1 references. Present location Ohio. Box 5501.

STUDENT WANTS SUMMER WORK

College civil engineering student living in Milwaukee, Wisconsin desires practical summer work with small pay on some small job, such as waterboy, flagman, rodman or stake boy for surveying, timekeeper, clerk, etc. in construction or open pit mining operation. Can furnish references. Box 5502.

SHOVEL OPERATOR

Three years' experience on Bucyrus-Erie Gas +Air on basement excavating, highway and street grading, also 8 years' experience on Erie, Marion and Bucyrus steam shovels. Will go anywhere in U. S. or Canada. Can do own repairing. A-1 references. Married. Present location Minnesota. Box 5504.

MINING ENGINEER

Mining Engineer, 34, married, fluent Spanish, desires position with responsible company. Experience — two years assistant engineer gold mine; three years foreman in large underground copper mine; six years foreman to mine superintendent open pit operating 25 electric shovels and draglines. Available immediately. Location, Maryland. Box 3801.

ENGINEER-FOREMAN-SUPERINTENDENT

Seven years' experience for Guggenheim Bros. in Bolivia and Chile as mining engineer and mining foreman. Later joined Snare Corporation as quarry engineer and in charge of all blasting, railroad work, maintenance and crushing plant, later in full charge of quarry. Assigned to plan excavation for spillway and construction on the dam of the Malpaso Power project for the Cerro de Pasco Copper Corporation in the Peruvian Andes. At present employed as quarry superintendent in Europe but would like to secure more responsible position preferably in South America. 36 years old, married, no children. Graduate Norwegian Technical College with one year post-graduate work at Columbia. Talks fluent Spanish, German, English, Scandinavian and fair French. Capable of planning and directing almost any type of excavating project. Write Box 5301.

Trade Notes

The Diesel Engine Manufacturers' Association has announced the election of H. Birchard Taylor of Philadelphia as president to succeed George W. Codrington of the Winton Engine Company of Cleveland, who was elected Chairman of the Board. E. T. Fishwick of the Worthington Pump and Machinery Corporation continues as Chairman of the Executive Committee. Mr. Taylor proposes to devote a considerable proportion of his time to the active management of the Association. Organized in 1928, the Association has since been active in promoting trade standards in the Diesel industry and in gathering Diesel engine statistics.

The American Cable Company announced that the **Wickwire Spencer Steel Corporation** has been licensed to manufacture preformed wire rope under the American Cable Company's patents.

Book Reviews

General Electric Company, Schenectady, N. Y., recently published a 54 page bulletin entitled "Synchronous Motors." The bulletin describes the economics and operating characteristics of high-speed and low-speed motors; special synchronous motors; synchronous motor-generators; the relation of synchronous motors and power-factor; and control equipment for synchronous motors. The bulletin is attractively illustrated with a large number of General Electric typical synchronous motor installations. For a copy of this bulletin write the manufacturer, mentioning this magazine.

FOR SALE

RATES:	First insertion rate per column inch	Repeat insertions (no change in copy) rate per column inch
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Over 7 inches	4.00	3.50

Rates are net (no commissions, no discounts) and payable in advance of publication. Send your remittance with insertion order and copy.

Address all box numbers c/o Excavating Engineer at South Milwaukee, Wisconsin

Small Shovels
Under 2 Yards

USED P&H MODEL 700 gasoline, combination shovel-dragline, shop number 3007, including 1¼-cubic-yard drag scraper bucket. Dragline boom 40-foot plus 10-foot extension, shovel boom 25-foot 10-inches, dipper handle 19-foot 3-inches, dipper 1¼-cubic-yard. Engine Waukesha Type WL 4 cylinder 6¼"x7". Good condition. Some repair parts on hand. Machine located Tilleda, Wisconsin. Box 378-SS.

BUCYRUS-ERIE SLIGHTLY USED ½-CUBIC YARD Rope crowd gasoline shovel. Will demonstrate. Box 282-SS.

BUCYRUS-ERIE EXTRA HIGH LIFT B-3 STEAM SHOVEL, 21-foot 3-inch boom, 18-foot 4-inch dipper handle, ⅝-yard dipper, power boom hoist, single shaft "cat". Located Massachusetts. Good condition. Priced very low. Box 385-SS.

BUCYRUS-ERIE 20-B steam shovel ¾-yard Dipper, $850. Chicago territory. Box 348-SS.

THREE TYPE A BUCYRUS-ERIE STEAM SHOVELS. Good value. $500 each.

FOUR TYPE B BUCYRUS-ERIE STEAM SHOVELS. Good operating condition. $1000 each. Box 328-SS.

ONE 18-B BUCYRUS-ERIE, ⅞-yard dipper on full revolving caterpillars. Box 182-SS.

BRAND NEW PAGE DRAG SHOVEL EQUIPMENT suitable for application to Bucyrus-Erie 1030, 1035, or 32-B machines now in the field, consisting of 17-foot 1½-inch boom, 11-foot dipper handle, and two ¾-cubic-yard dippers: one 38-inches wide over cutters—the other 49½-inches wide over cutters, together with auxiliary A frame and ropes. Priced below cost. Box 381-SS.

MARION MODEL 21 COMBINATION HIGH LIFT STEAM SHOVEL, ¾-cubic-yard manganese steel dipper, 15-foot dipper handle, 20-foot shovel boom. Also includes 40-foot boom crane equipment including two drums. Boiler retubed and machine is in excellent operating condition. Location about 15 miles from Baltimore, Maryland. Price for immediate acceptance, subject to prior sale, f.o.b. present location—$1,800. Box 396-SS.

BUCYRUS-ERIE REBUILT DIESEL combination 1½-cubic-yard rope crowd shovel and 50-foot boom dragline. Atlas Diesel engine. Used very little. New machine guarantee. Box 392-SS.

THEW "O" ¾-cubic-yard gas shovel rebuilt 1931 and mounted on new center drive "cat". Box 343-SS.

MARION MODEL 32, shop No. 5459, mounted on "cats," steam-powered, 1¾-cubic-yard dipper, 24-foot boom, 17-foot 6-inch dipper handles. Box 82-SS.

ONE TYPE "B" BUCYRUS-ERIE STEAM MACHINE, mounted on "cats", ¾-cubic-yard dipper, shop number 2301, 19-foot boom and 16-foot dipper handle. Box 83-SS.

CHEAP!

Two 20-B Bucyrus steam shovels. Located Aurora, Illinois. Price each $1500.

30-B Bucyrus steam shovel. Located Charleston, Mississippi. Price $1500. Box 303-SS.

P. & H. MODEL 206 Gasoline Combination Shovel and Clamshell machine. Good condition. Located vicinity Chicago. Box 336-SS.

20-B BUCYRUS-ERIE STEAM SHOVEL, serial number 4000; caterpillar mounted; 18-foot boom, 12-foot 6-inch dipper handle, 1-yard dipper; shipped new in 1923; located western Missouri. Bargain. Box 241-SS.

BUCYRUS-ERIE SLIGHTLY USED 1035 gas friction shovel, factory inspected, new machine guarantee. Rope Crowd, 23-foot boom, 15-foot dipper handle, ⅞-yard dipper, including Kohler light plant installed. Exceptional bargain. Box 382-SS.

BUCYRUS-ERIE TYPE "GA-2" GAS+AIR SHOVEL, shop number 4117, mounted on spur gear drive caterpillar trucks, and equipped with a 24-foot boom; 18-foot, 4-inch dipper handle; 1-cubic-yard manganese cast front socket inserted tooth dipper; power boom hoist; air self-starter, and all equipment and appurtenances in accordance with the specifications of Bucyrus-Erie Company, f.o.b. cars shipping point Virginia. Box 126-SS.

P&H MODEL 204. Shop number above 2200 combination Shovel Clamshell. 19' shovel boom, 14' 6" dipper handles, ½ cubic yard dipper, 35' clamshell boom, ½ cubic yard Owens Type M digger type bucket. Both front end equipments less than one year old. Excellent condition. Box 254-SS.

BARGAIN

Bucyrus-Erie Type B number 1982, ¾-yard steam shovel on caterpillar mounting with dragline attachment. Ideal for Construction work or Placer mining. Good condition, located Colorado Springs, Colo. Price right. Box 362-SS.

NORTHWEST SHOVEL, model 105, caterpillar mounted, 24-foot boom, 1-cubic-yard dipper, 16-foot dipper handle. In good condition. Price $4,500, f. o. b. Utica, New York. Box 34-SS.

BUCYRUS-ERIE 21-B GAS FRICTION SHOVEL, 18-foot 6-inch boom, 14-foot dipper handle, ¾-yard dipper, chain crowd, single shaft "cat". Wisconsin B-3 4-cyl. 5½x6½-inch engine. Shipped from factory August, 1931. Excellent condition. Sale price approximately one-half new selling price. Will rent. Box 387-SS.

SHOVEL—Slightly used Bucyrus-Erie 1½ cu. yd. chain crowd shovel Wisconsin 6 cylinder Gas engine—Excellent condition. Box 402-SS.

SHOVEL—Rebuilt Bucyrus-Erie—1½ cu. yd. high lift Model 43-B shovel—6 cyl. Atlas Diesel engine. 50' boom dragline equipment available—new machine guarantee. Box 403-SS.

SHOVEL—Practically new Bucyrus-Erie—1¼ cu. yd.—Extra high lift rope crowd—shovel—Atlas Diesel engine. Extra wide Cat. Kohler light plant. Dragline equipment available. New machine guarantee. Box 404-SS.

SHOVEL—Pratically new Bucyrus-Erie—1½ cu. yd.—Extra high lift rope crowd—shovel—Atlas Diesel engine. Extra wide Cat. Kohler light plant. Dragline equipment available. New machine guarantee. Box 405-SS.

BUCYRUS ERIE So. Milwaukee, Wis.

OFFERS FOR SALE OR RENT

FACTORY REBUILT and USED SHOVELS--CRANES--DRAGLINES

Please send me full details on:

- ☐ B-E ⅞-yd. Gas Shovel. Slightly used.
- ☐ P. & H. 600 1-yd. Shovel-Dragline.
- ☐ B-E 32-B Gas Drgln. 45-ft. boom. Like new.
- ☐ Osgood "Conqueror" 1-cubic-yard gasoline shovel. 6 cylinder Le Roi Engine. Starter battery system. Good condition.
- ☐ Monighan Dragline 60-ft. boom. Priced right.

Name _____

Address _____

FOR SALE

Address all box numbers c/o Excavating Engineer at South Milwaukee, Wisconsin

Small Shovels
Under 2 Yards
Continued

MARION STEAM SHOVEL, MODEL No. 21, high lift boom, and forward drum, boiler just retubed, location near Baltimore, in excellent condition. Price $1,800. Address Box 267-SS

REBUILT GA-2 BUCYRUS-ERIE SHOVEL mounted on single shaft caterpillar, 1¼-cubic yard inserted tooth dipper, 22-foot 6-inch boom, 16-foot dipper handle, starter. Carries guarantee of new machine. Box 43-SS.

MARION MODEL 21 AC-DC electric shovel, 20-foot boom, 15-foot dipper handle, ¾-cubic-yard dipper. Suitable to operate on power-supply 3-phase 60-cycle 220 or 440 volt. First class condition. Box 203-SS.

BYERS BEARCAT, Model 27, gasoline ½-cubic-yard Skimmer scoop, crane-clamshell and drag shovel with front opening dipper. Engine—4-cylinder, 4"x5" Hercules Model OX. Machine new July 1928. Excellent condition. Box 293-SS.

TYPE B BUCYRUS-ERIE COMBINATION HIGH LIFT STEAM SHOVEL, 19-foot 8-inch boom, 16-foot dipper handle, ⅝-cubic yard dipper, power boom hoist and 36-foot boom clamshell equipment complete. Located central Indiana. Price as is, f.o.b. present location $2,000. Box 311-SS.

FOR SALE—AMERICAN STEAM DITCHER, equipped with ¾-cubic-yard bucket, mounted on flange wheels for off the car service and including caterpillar mounting. Machine in excellent mechanical condition. Located in Southeastern Arkansas. Box 159-SS.

RECONDITIONED TYPE-A BUCYRUS-ERIE STEAM SHOVEL on caterpillars, ⅝-cubic-yard dipper, 16-foot boom, 13-foot dipper handle, boom hoist, Massachusetts boiler. Machine thoroughly inspected, worn parts replaced. Guaranteed to be in first class operating condition. Will rent or sell. Box 37-SS.

20-B BUCYRUS-ERIE DIESEL SHOVEL with 36-foot dragline boom. Machine No. 4133.

20-B BUCYRUS-ERIE STEAM SHOVEL with 36-foot dragline boom. Machine No. 4145.

BUCYRUS-ERIE GAS + AIR CRANE with 40-foot boom, ¾-yard Page Dragline bucket. Fairleads and shovel boom, no dipper stick. Machine No. 4347.

TYPE B BUCYRUS-ERIE High Lift Steam shovel. Machine No. 3110.

Box 373-SS.

MARION TYPE 32 FULL REVOLVING STEAM SHOVEL, shop number 4639, mounted on four belt caterpillar type mounting and equipped with standard boom and dipper handle and 1¼-cubic-yard dipper. Shipping point western Virginia.

This machine should be an excellent purchase at the price offered, for quarry or slag bank operation. Box 212-SS.

BUCYRUS-ERIE 1030, ¾-cubic-yard rope crowd gasoline shovel. Factory rebuilt and guaranteed. Box 283-SS.

TYPE B-2 BUCYRUS-ERIE STEAM SHOVEL, number 9830, mounted on single shaft caterpillar type mounting. Equipped with 21-foot 3-inch boom, 16-foot dipper handle, ⅞-cubic-yard inserted tooth dipper. Boom hoist and Mass. standard boiler. Located vicinity of Boston. Reasonably priced. Box 345-SS.

BUCYRUS-ERIE brand new 1035 gasoline shovel, rope chain crowd. Also clamshell or dragline equipment. At price you cannot refuse to consider. Box 356-SS.

BUCYRUS-ERIE GAS+AIR Combination high lift shovel and dragline equipment. Chain drive. "Cats." Very good condition. Located vicinity Chicago. Box 337-SS.

P&H MODEL 600—1-yard Gasoline Shovel. Three years old. Excellent condition throughout. Just been thoroughly overhauled. Will sacrifice at bargain to responsible buyer. Located in Wisconsin. Box 363-SS.

Small Draglines
Under 2 Yards

DRAGLINE—Rebuilt—Bucyrus-Erie — 50' boom dragline—Model 43-B—6 cyl. Atlas Diesel Engine—1½ cu. yd. rope crowd shovel equipment available. New machine guarantee. Box 401-SD.

DRAGLINE—Practically new—Bucyrus-Erie—40'-45' or 50' boom Dragline—6 cyl. Atlas Diesel Engine—Long "Cat" with wide treads. Kohler light plant. 1¾ yd. Omaha bucket—rope crowd shovel equipment available. New machine guarantee. Box 393-SD.

P & H Model 206 B Dragline. Good operating condition. Very favorably priced. Box 390-SD.

BUCYRUS-ERIE GAS+AIR combination high lift dragline and shovel. Chain drive. "Cats." Excellent condition. Located vicinity Chicago. Box 337-SD.

BUCYRUS-ERIE E-2 DIESEL DRAGLINE, caterpillar mounted, 50-foot boom, 1¼-cubic-yard Omaha bucket, Kohler lighting plant. Machine was new in July 1930 and has been used less than 6 months. Box 248-SD.

If You Do Not Find What You Want Listed—Write Us
Excavating Engineer
South Milwaukee, Wis.

P&H MODEL 700 USED GASOLINE COMBINATION DRAGLINE-SHOVEL, shop number 3007, 40-foot dragline boom plus 10-foot extension and 1¼-cubic-yard drag scraper bucket. 25-foot 10-inch shovel boom, 19-foot 8-inch handle and 1¼-cubic-yard dipper. Waukesha Type WL 4 cylinder 6½"x8" engine. Good condition. Some repair parts on hand. Machine located Tilleda, Wisconsin. Box 378-SD.

30-B BUCYRUS-ERIE DIESEL DRAGLINE with 40-foot boom and 1-cubic-yard bucket located in Alabama. Box 91-SD.

P & H MODEL 700 DRAGLINE; number 2894 equipped with a 50-foot boom, light 1½-cubic-yard drag bucket, electric light plant, and powered with 4-cylinder Atlas Diesel engine. Box 189-SD.

P & H DRAGLINE MODEL 700; number 2456 equipped with a 50-foot boom, light 1½-cubic-yard drag bucket, electric light plant, and powered with a Waukesha gasoline engine. Box 190-SD.

FOR SALE OR RENT

One practically new Bucyrus-Erie Model E-2 Dragline, Diesel driven, equipped with 50' boom and 1½-yard Omaha dragline bucket, now located at Shenandoah, Iowa. Box 244-SD.

Small Clamshells and Cranes
Under 2 Yards

MARION MODEL 21 HIGH LIFT STEAM CRANE with 40-foot boom equipment including two drums. Also has 20-foot shovel boom, 15-foot dipper handle and ¾-yard manganese steel dipper. Boiler retubed and machine is in excellent operating condition. Located about 15 miles from Baltimore, Maryland. Price for immediate acceptance, subject to prior sale, f.o.b. present location—$1800. Box 396-SCC.

GENERAL 35-FOOT BOOM CLAMSHELL MACHINE and ½-cubic-yard Lakewood bucket. Equipped with four cylinder Buda gasoline engine. Machine new September 1929. Box 335-SCC.

NORTHWEST MODEL 104, combination 45-foot boom clamshell and dragline. Will handle 1¼ cubic-yard bucket. Also 1¼ cubic-yard Pull shovel attachment. Shop number around 1800. Good condition. Will demonstrate. Priced to sell. Box 297-SCC.

LITTLE GIANT CRANE—Gas—Caterpillar Model C. Type B—¾-yd. bucket. Recently overhauled. Now working. $1,500.

BROWNHOIST CRANE — Gas — Cats. Model 2-C Serial No. 8829. 1-yd. bucket. Good working condition. $1,500.

McMYLER MODEL J. LOCOMOTIVE CRANE—35 Ton Steam. 50 and 75-ft. Boom. 1½ or 2-yd. buckets. New boiler and swinging engine recently installed. A real crane for long reach and heavy work. Thoroughly overhauled condition. $4,500.

Box 346-SCC.

P. & H. MODEL 206 combination clamshell and shovel. Located near Chicago. Good condition. Box 336-SCC.

BUCKEYE CLAMSHELL-CRANE, gasoline driven, caterpillar mounted, equipped with 30-foot boom, ⅝-cubic-yard clamshell bucket, fairleads and backfiller scraper. Located in Milwaukee, Wisconsin. Box 371-SCC.

Large Shovels and Draglines
2 Yards and Over

A BARGAIN

All kinds parts for model 300 steam and electric shovels. 6-yard dipper, trucks, dipper sticks, rot. segments, etc., shovels of all sizes.

McCartney Machinery Co.
103 E. Indianola Youngstown, O.

50-B BUCYRUS-ERIE ELECTRIC SHOVEL, equipped with 3-phase A. C. current, 550 volts, 60 cycle and has three motors. New Manganese steel dipper. Located South Carolina. Box 226-LSD.

50-B DIESEL DRAGLINE; equipped with 50-foot boom, electric light plant, mounted on "cats." Located Vincennes, Indiana. Can be seen at any time. New August 1927. Box 78-LSD.

2½-YD. DRAGLINE

Class 220 Page Dragline; 100 H.P. Charter-Horizontal Twin Cylinder engine; 72-foot boom; 2½-cubic-yard Page bucket. Located Northwestern Indiana. Box 200-LSD.

85-C STEAM SHOVEL, on caterpillar mounting. caterpillars in good condition, price $2,500. Located near Hazelton, Pa. Box 163-LSD.

BUCYRUS-ERIE 50-B STEAM SHOVEL, 26-foot boom, 15-foot handles, two-cubic-yard rock dipper. Shop number 9954. Shipped new in 1928. Machine in good operating condition and can be inspected under steam at Eastern Location. Box 397-LSD.

FOR SALE

Address all box numbers c/o Excavating Engineer at South Milwaukee, Wisconsin

Large Shovels and Draglines
2 Yards and Over
Continued

CLASS 14 STEAM-DRIVEN DRAGLINE. New 1922. Shop number about 3700. Mounted on skids and rollers. Equipped with 60-foot boom, 2-cubic-yard bucket and electric light plant. Located western Iowa. Priced to sell. Box 395-LSD.

50-B STEAM SHOVEL, Number 3946; equipped with 1½-cubic-yard dipper, 26-foot boom, also 1½-cubic-yard dragline bucket with 50-foot boom caterpillar mounted, equipped for burning oil, located at Texarkana, Ark. Price very reasonable. Box 112-LSD.

BUCYRUS-ERIE SHOP REBUILT 100-B STEAM SHOVEL; shop number 4890; 29-foot 6-in. boom; 20-foot handle; three-cubic-yard dipper. Can be inspected at So. Milwaukee, Wis. Priced to sell. Box 187-LSD.

For Sale or Rent

ONE CLASS-14 STEAM DRAGLINE excavator. Number 3402, 70-foot boom, 2-cubic-yard bucket, caterpillar mounted, equipped for burning gas or oil. Priced very reasonable. Located at Grand Prairie, Texas. Box 110-LSD.

68-C BUCYRUS ELECTRICALLY OPERATED SHOVEL, equipped with 2½-yard manganese front dipper, 3 phase, 60-cycle, 440-volt motors, transformers, cable reel and approximately 1400 feet of cable, all in excellent condition. Reasonable price.
Address Box 268-LSD.

6-YD. SHOVEL

BUCYRUS-ERIE 320-B electric shovel, Ward-Leonard control, 3 phase, 60 cycle, 2300 volts, equipped with 6-cubic-yard dipper, 85-foot boom and 58-foot handles. Is in good condition and may be inspected in operation. Reasonably priced. Box 279-LSD.

70-TON STEAM SHOVEL mounted on "cats," caterpillars in good condition. Located near Hazelton, Pa. Box 162-LSD.

225-B OWNERS

You may be interested in a partial Bucyrus-Erie 225-B steam shovel located in Kentucky coal fields as a source of spare parts. No reasonable offer refused. Box 211-LSD.

MONIGHAN STEAM DRAGLINE, with 123-foot boom, 3½-cubic-yard bucket, mounted on skids and rollers, located southeastern Iowa. Box 367-LSD.

MONIGHAN DRAGLINE MODEL T, 2-cubic-yard 60-foot boom located near Wichita, Kansas, where it is now working. About seven years old. Has recently been thoroughly overhauled. Box 180-LSD.

DIESEL-ELECTRIC DRAGLINE

Class 14 Diesel electric dragline, Shop Number 5079, new fall of 1927 with 70-foot boom, 2-cubic-yard bucket, and with extra 10-foot extension, western location. Box 296-LSD.

50-B STEAM SHOVEL, new March 1927. Shop number about 4950. Has 26-foot boom, 17-foot dipper handle and 2-cubic-yard dipper. Priced to sell. Box 240-LSD.

For Sale or Rent

ONE CLASS-14 STEAM DRAGLINE excavator Number 3327 60-foot boom, 2-cubic-yard bucket, caterpillar mounted, equipped for burning gas or oil. Price very reasonable. Located at Turkey Creek, La. Box 111-LSD.

175-B STEAM SHOVEL No. 4090, equipped with 75-foot boom, 48-foot dipper handle and 3½-cubic-yard dipper. Machine is in very good condition. Oversize boiler. Box 148-LSD.

3-YD. SHOVEL

BUCYRUS 78-C, caterpillar mounted; three-cubic-yard dipper; shop number 3611. Boom rebuilt last year. Equipped with new 103-C boiler and will pass boiler inspection in any state. Shovel is in very good condition and is in operation at present time. Box 326-LSD.

70-C BUCYRUS STEAM SHOVEL on Cats. Complete. In operating condition. Shop number 1712. Also one extra three-yard Manganese dipper. $2,000. Chicago territory. Box 347-LSD.

MONIGHAN DIESEL 3 YARD 70-foot boom Dragline Excavator in first-class condition, can be seen running at waters edge, Detroit. Edward Gray, Grayhaven Detroit, Michigan. Box 400-LSD.

BUCYRUS 320-B STEAM STRIPPING SHOVEL, shop number 4205, new in 1925, used less than four years. Located at Toronto, Ohio. Box 74-LSD.

BUCYRUS 80-B STEAM SHOVEL, shop number about 3800; 2-cubic-yard dipper; 48-foot boom; 32-foot dipper handle. "Cat" mounted. Priced to sell. F.o.b. cars. Box 255-LSD.

TYPE 175-B ELECTRIC, No. 794 equipped with 87' shovel boom, 48' dipper handle, 3½-yd. bucket, and dragline equipment including 125' boom, and 3½-yd. bucket. This machine was recently reconditioned and is in good operating condition. Present location, Connecticut. Box 263-LSD.

BUCYRUS 70-C, Shop number around 1500. Thoroughly overhauled. Good working condition. Eastern location. Box 299-LSD.

CLASS-24 BUCYRUS-ERIE STEAM DRAGLINE, shop number 912; 115-foot boom, 3½-cubic-yard Page bucket. Florida location. Box 73-LSD.

SHOVEL FRONT END for 175-B Bucyrus-Erie 65-foot boom, 47-foot dipper sticks and 3½-cubic-yard dipper. Located in Ohio. Box 10-LSD.

What Do You Bid On a

70-C STEAM SHOVEL located near Marietta, South Carolina, where it completed a railroad job? Bargain as supplementary shovel or as supply of spare parts.

88-C STEAM SHOVEL located in Kansas. Carefully laid up after completing season's work. 3½-yard dipper. Fine condition. Any reasonable offer accepted. Box 52-LSD.

If You Do Not Find What You Want Listed—Write Us

Excavating Engineer
South Milwaukee, Wis.

Miscellaneous Equipment

LOCOMOTIVES

8 **BALDWIN,** 17x24, straight drive standard gauge 45 ton locomotives. 54 inch boilers. Shop numbers from 32,750 to 34,611. Each one has passed State Boiler Inspection yearly. Boilers will stand cold water test of 240 lbs. At present in actual service in Minnesota mine.

2 **BALDWIN** Locomotives, 19x26, standard gauge, 6 wheel switching type, shop numbers 39534 and 39536. Box 152-ME.

COMPLETE EQUIPMENT for 2 strip mines, contractors or quarry operations, No. 300 and No. 36 Marion steam shovels, well drills, locomotives, cars, crushers, picking tables, loading booms, cable and button retarders, compressors, motors, transformers, flood and search lights, camp equipment and new repair parts for above. Box 195-ME.

OPPORTUNITY OFFERED

We have a Bucyrus 14 dragline on caterpillars, 87-foot 9 inch boom and two cubic yard bucket in working condition which we wish to sell together with about five years stripping work for same. Box 394-ME.

FOR SALE

1—Whitcomb 12-ton—36" gauge—6 cylinder—Gasoline Locomotive.
4—Side Dump Koppel Industrial Cars—36" Gauge—5 yards capacity.
125 tons 35 lb., 25 tons 40 lb., and 5 tons 25 lb. relaying rails.
All this equipment in first class condition. Located at Lucinda, Clarion County, Pennsylvania. Address Excavating Engineer, Box 398ME.

SMITH 27-E PAVER, gasoline driven caterpillar mounted, bought new late in 1930. Has handled less than 40,000 yards of paving. Priced to sell. Located in Arkansas. Box 312-ME.

PRICED TO SELL

Excess Equipment in very good condition needed in quarry.

1—6 wheel Mack A.C. Bulldog—162 inch wheelbase—6 yard Heil dump body and hoist.

1—Mack A.C. Bulldog—138 inch wheelbase 4 yard Heil dump body and hoist.

5—Mack A.C. Bulldog—Tractor type 120 inch wheelbase—4 yard Heil dump body and hoist.

Ideal for subgrade or dump work where speed is not a factor. Box 399-ME.

FOR SALE

Address all box numbers c/o Excavating Engineer at South Milwaukee, Wisconsin

Miscellaneous Equipment
Continued

DUMP CARS

6—8-yard Western — 36-inch Gauge — 2-way side.

LOCOMOTIVES

1—15-ton, 10x14 — 36-inch Gauge — Vulcan Saddle Tank.
2—21-ton, 11x16 — 36-inch Gauge — Vulcan Saddle Tank.

BOILERS

1—100 h.p. Locomotive Type for 70-C Bucyrus shovel.
1—32 h.p. Locomotive Type Stationary.

Box 181-ME

WANTED

Used electric welding outfit, 200 ampere capacity. Must be in good condition. Address Box 379-ME.

4 LA PLANT-CHOATE, 6-yard, all-steel, dump wagons. Equipped with wide iron wheels. Price $200.00 each. Chicago territory. Box 349-ME.

For Sale or Rent

Two 40-ton, 6-wheel switchers. Recently overhauled and rebuilt. Two 50-ton, 6-wheel switchers. In excellent condition. Location Chicago. Box 306-ME.

COMPLETE CONTRACTORS EQUIPMENT

Offered for sale by Southern contractor. Priced to sell.

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2—Jordan Spreaders.
2—Locomotives, 26 Ton, American Saddle Tank
32—12-yd. Western Heavy Duty Dump Cars
3—Camp Cars
1—Flat Car
2—1-bag Gasoline Concrete Mixers
Pumps, Boilers, Jacks and Other Tools

For further particulars, Address Box 138-ME.

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If you do not find the equipment for your present needs described in our advertising pages, write us. We will do our best to have the desired information mailed to you promptly.

Excavating Engineer

BUCYRUS-ERIE COMPANY

SOUTH MILWAUKEE, WISCONSIN, U. S. A.
Works: South Milwaukee, Wis., Erie, Pa., Evansville, Ind.

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Ruston-Bucyrus Limited

Headquarters and Works: LINCOLN, ENGLAND.
London Office, Imperial House, 15, 17, 19 Kingsway W. C. 2.

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Works: Chicago, Ill.

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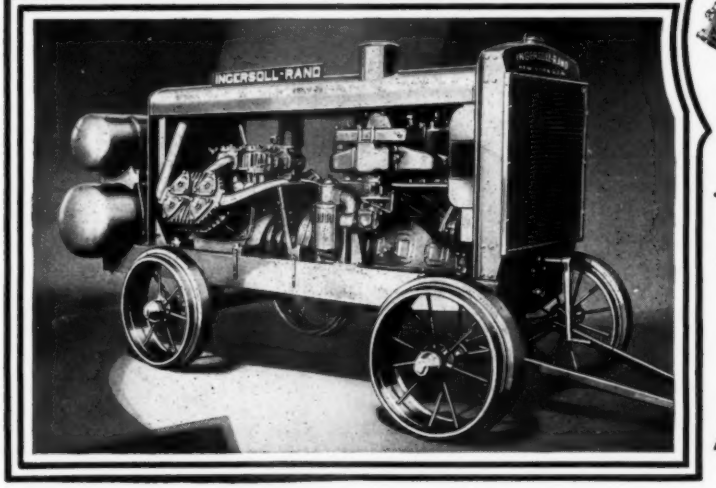

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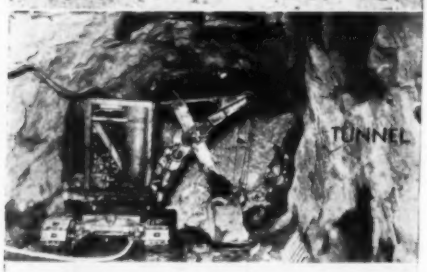
Beating Nature on her own home grounds!



The problems you encounter on even your toughest jobs are no strangers to Bucyrus-Erie. During the past 53 years this organization has built, installed and serviced more than 13,000 excavators . . . and watched them succeed in "beating Nature on her own home grounds" in over 50 countries of the world.

Practical operating experience is responsible for the balanced value offered in the complete line of modern Bucyrus-Erie machines. Because they stand up under the extremes you seldom encounter they can be counted on to give longer life and more dependable service.

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BUCYRUS-ERIE COMPANY
South Milwaukee, Wis.

All Sizes—½ yd. to 18 yds.
Shovels : Draglines : Dragshovels : Cranes
Clamshells : Dredges : Tower Excavators
Tunnel Shovels : "Loadmaster" Cranes
Bucyrus-Monighan Walking Draglines.
Gasoline : Diesel : Electric : Gas + Air : Steam
Red Arch Dragline Buckets.

612

UNBALANCED FEATURES mean TROUBLE and LOSS
BALANCED VALUE means LOW COST OUTPUT
Do not purchase any machine—new or used—without considering dependability, power, speed, operating efficiency and upkeep economy; weigh the reputation, experience and resources of the manufacturer.

BUCYRUS ERIE

SEE BUCYRUS-ERIE BEFORE YOU BUY!

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